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ABSTRACT

Using a qualitative research methodology, known as the Delphi Method, an interactive panel of experts was convened to work toward a consensus on the role of critical thinking (CT) in educational assessment and instruction. In Delphi research, experts participate in several rounds of questions that require thoughtful and detailed responses. Panelists work toward consensus by sharing reasoned opinions and reconsidering the opinions with regard to comments, objections, and arguments offered by other experts. A total of 46 scholars, educators, and leading figures in CT theory and CT assessment research were gathered for the panel meetings. About half of the panelists were primarily affiliated with philosophy departments; the others were affiliated with education, social sciences, or physical sciences. Recommendations resulting from the discussion rounds address the cognitive skill dimension of CT, the dispositional dimension of CT, and specific recommendations on CT instruction and assessment, including development of a CT curriculum. A discussion of commercially available CT assessment tools, a bibliography with an emphasis on assessment, and a set of letters which chronicle the progress of the Delphi research group are appended. (TJH)

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CRITICAL THINKING:

A STATEMENT OF EXPERT CONSENSUS FOR PURPOSES OF EDUCATIONAL ASSESSMENT AND INSTRUCTION

Research Findings and Recommendations
Prepared for the
Committee on Pre-College Philosophy
of the
American Philosophical Association

by
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FOR PURPOSES OF EDUCATIONAL ASSESSMENT AND INSTRUCTION

I -- The Critical Thinking Movement and CT Assessment

From New Jersey to California, and from Newfoundland to Florida, leaders in the critical thinking movement have advocated major educational reform. They have argued that effective and meaningful education requires that curricular, pedagogical and assessment strategies at all levels of education be coordinated so as to foster in students those cognitive skills and habits of inquiry associated with critical thinking. They have made the case that educating students to be critical thinkers is vital for the students themselves and for society in general, (Ennis, 1962, 1981, 1986; Passmore, 1967; Schievella, 1968; Sheffler, 1973; Lipman, 1977; Siegel, 1980, 1988; Gardner, 1983; Arons, 1983; Beyer, 1985; Costa, 1985; Quellmalz, 1983, 1985; Scriven, 1985; Sternberg, 1985; Ruggiero, 1988; Paul, 1988 (a) and (b); etc.).

The arguments for critical thinking have been successful.

After decades of relative neglect, the eighties witnessed a growing accord that the heart of education lies exactly where traditional advocates of a liberal education always said it was -- in the processes of inquiry, learning and thinking rather than in the accumulation of disjointed skills and senescent information. The critical thinking movement gained momentum throughout the decade. Conferences and position papers led to the development of college level critical thinking (CT) courses. In elementary and secondary schools (K-12) teachers revised lesson plans to incorporate CT objectives. In the span of a few years publishing CT textbooks and offering CT staff development programs became growth industries. The CT movement enjoyed major success when

universities introduced CT requirements into their general education programs and state departments of education targeted CT in their curricular frameworks and their standardized testing programs. By the decade's end CT could no longer be characterized as a cottage industry.

With success come questions: Not new ones necessarily, but, because of the expectations which have been raised and the investments being proposed, vexing ones. Intuitively, CT instruction should focus on how students approach a question and reason about it. CT pedagogy should develop in students those cognitive skills and affective dispositions which characterize the good critical thinker. Rather than or in addition to targeting whether a given answer is correct, CT assessment should target the quality of the critical thinking the students put into arriving at that answer. Thus, for all of their successes, CT experts find they must continue to address some fundamental academic concerns. What exactly are those skills and dispositions which characterize CT? What are some effective ways to teach CT? And how can CT, particularly if it becomes a campus-wide, district-wide or statewide requirement, be assessed?

When these academic questions are asked by the individual professor or teacher seeking to introduce CT into her own classroom, they are difficult enough. But the questions take on social, fiscal, and political dimensions when asked by campus curriculum committees, school district offices, boards of education, and the educational testing and publishing industries. This is not to say that the experts find these questions insurmountable. On the contrary, CT experts have worked with their colleagues in the education community on some remarkable projects. For example, California and New Jersey have established ways of introducing CT into their curricular frameworks and statewide testing

programs. The twenty-campus California State University system, which enrolls hundreds of thousands of students, has established a process for the approval of CT courses for its general education requirement.

Given the central role played by philosophers in articulating the value, both individual and social, of CT, in analyzing the concept of CT, in designing college level academic programs in CT, and in assisting with efforts to introduce CT into the K-12 curriculum, it is little wonder that the American Philosophical Association, through its Committee on Pre-College Philosophy, has taken an interest in the CT movement and its impact on the profession. In December of 1987 that committee asked this investigator to make a systematic inquiry into the current state of CT and CT assessment.

TABLE 1

CONSENSUS STATEMENT REGARDING CRITICAL THINKING AND THE IDEAL CRITICAL THINKER

We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based. CT is essential as a tool of inquiry. As such, CT is a liberating force in education and a powerful resource in one's personal and civic life. While not synonymous with good thinking, CT is a pervasive and self-rectifying human phenomenon. The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit. Thus, educating good critical thinkers means working toward this ideal. It combines developing CT skills with nurturing those dispositions which consistently yield useful insights and which are the basis of a rational and democratic society.

As Table 1 suggests, a key result of inquiry is the articulation by a panel of CT experts of a conceptualization of CT it terms of two dimensions: cognitive skills and affective dispositions. Section II of

this report describes the Delphi research methodology. Section III address the skill dimension of CT, and Section IV the dispositional dimension of CT. Research findings are presented throughout the report, both in the text and in tabular form. Six recommendations are presented in Sections III and IV so they can be related most sensibly with their rationale. Nine additional recommendations which pertain specifically to CT instruction and assessment are presented in Section V.

II -- Research Methodology and Purpose

The Committee on Pre-College Philosophy suggested several persons with special expertise in CT and CT whom this investigator might contact as part of the inquiry into the controversial issues known to lie at the heart of the profession's concern. This investigator decided to employ the powerful qualitative research methodology known as the Delphi Method. The Delphi Method requires the formation of an interactive panel of experts. These persons must be willing to share their expertise and work toward a consensus resolution of matters of opinion. Using the first group of experts to nominate others, the Delphi panel soon took shape. In all forty-six persons, widely recognized by their professional colleagues to have special experience and expertise in CT instruction, assessment or theory, made the commitment to participate in this Delphi project. If it were not for their conscientious effort, (for which this investigator is extremely appreciative), the consensus expressed in this report could not have been reached.

In Delphi research experts participate in several rounds of questions which call for thoughtful and detailed responses. Achieving a consensus of expert opinion using the Delphi Method is not a matter of

voting or tabulating quantitative data. Rather the expert panelists work toward consensus by sharing their reasoned opinions and being willing to reconsider them in the light of the comments, objections and arguments offered by other experts. In Delphi research, once an expert expresses an opinion, even a dissenting one, it becomes a factor in the mix and flow of all subsequent argument and thought. To circumvent undue influence arising from any given expert's professional status, each round of questions is initiated by the project director and all responses are coordinated through that person. The project director circulates to the entire panel direct quotations and synthesized responses, with the names of their authors removed.

The expert panelists themselves, through the thoughtfulness and persuasiveness of their written responses, shape the line of inquiry. The project director endeavors to frame questions which respond to the direction panel debate is taking and lead the conversation toward fruitful resolution. As the inquiry proceeds, the project director assists the panelists with bibliographies and alerts them to other useful sources of relevant information. As areas of accord or disagreement emerge these are presented to the panel in the form of drafts of preliminary findings or crucial follow-up questions. The process terminates when the project director determines that sufficient accord has been reached for areas of consensus to be made public. Delphi findings also include descriptions of residual disagreement and statements of minority opinion.

A clear and accurate conceptualization of CT is absolutely essential for the development of valid CT assessment tools and effective CT instructional programs. With this in mind, and recognizing that divergent conceptualizations of CT have hindered curricular and

assessment efforts, early in the Delphi process the panel decided its most worthwhile contribution could be the articulation of a clear and correct conceptualization of CT. The expert panelists devoted their major effort toward that end. The experts hoped that by coming to consensus they could offer educators interested in CT assessment or instruction a conceptualization of CT of sufficient clarity, accuracy and richness to warrant their serious attention.

To balance the theoretical with the practical, the experts asked themselves what a generally educated college lower division level critical thinker should be able to do. However, they did not attempt to describe the typical college level critical thinker. It soon became evident that the experts were actually articulating an ideal. It may be that no person is fully adept at all the skills and sub-skills the experts found to be central to CT. It may be that no person has fully cultivated all the affective dispositions which characterize a good critical thinker. Also humans compartmentalize their lives in ways that CT is more active and evident in some areas than in others. This gives no more reason to abandon the effort to infuse CT into the educational system than that knowing no friendship is perfect gives one reason to despair of having friends. The experts' purpose in putting the ideal before the education community is that it should serve as a rich and worthy goal guiding CT assessment and curriculum development at all educational levels.

TABLE 2

PROJECT HISTORY

Round 1 (Feb. 11, 1988) and Round 2 (Mar. 14, 1988) initiated the Delphi process. In both rounds panelists were invited to nominate other CT experts to join in this research project. The experts reached consensus on the working assumption that "the concept of CT could be made operational to the extent that important parts of CT could be assessed validly and reliably." The experts agreed to begin their analysis of CT by "identifying the core elements of CT which might reasonably be expected at the freshman and sophomore general education college level." The rationale for this decision was that the college level theoretical construct of CT could reasonably be used to guide what might be said about CT at the K-12 level. Also the panelists noted that most of the participating experts had greater experience at the college level than in K-12 education.

Round 3 (May 4, 1988) was an open-ended invitation for experts to write their own list of the operations which they conceived of as central to CT. The first synthesis of this input was presented for expert review in Round 4 (Sept. 23, 1988). This synthesis focused on the skill dimension of CT. Round 4 invited responses regarding each skill and sub-skill identified, a proposed [and ultimately rejected] input/output model of CT operations, a list of closely related cognitive operations which might or might not be distinguished from CT, a general statement regarding what a skill is and how one is taught, and a list of caveats and cautions regarding CT instruction and assessment.

Round 5A (Feb. 28, 1989) reviewed the definitions and classification of CT cognitive skills in the light of expert responses to Round 4. Round 5B (also Feb. 28, 1989) proposed statements regarding the dispositional dimension of CT and about its possible normative connotations. Round 5C (Mar. 10, 1989) asked for specific recommendations regarding CT instruction and assessment, and offered a revision of the general statement on teaching and assessing a cognitive skill. Round 5 included several quotations culled from the panelists' earlier responses and invited comments and reactions.

The experts' comments regarding the various quotations included in each round added greatly to the project director's understanding of the experts' overall views. From these and the responses to specific Round 5A, 5B and 5C questions, the project director assembled a draft report of all Delphi findings, including recommendations. Round 6, (Sept. 25, 1989) circulated that draft and gave the CT experts the opportunity to express their views or make comments for inclusion in the final report, which went through its last revisions in Nov. 1989.

III -- The Cognitive Skill Dimension of Critical Thinking

FINDING: As indicated in Table 1, the experts find good critical thinking to include both a skill dimension and a dispositional dimension. The experts find CT to include cognitive skills in (1) interpretation, (2) analysis, (3) evaluation, (4) inference, (5) explanation and (6) self-regulation. Each of these six is at the core of CT. Associated with each are criteria by which its execution can be meaningfully evaluated. However, no attempt is made here to specify those criteria since ample criteriological discussions exist in the literature.

Concerned not to generate misunderstandings, the experts offer many cautions about the analysis of CT in terms of skills and sub-skills. The experts warn that good CT is not rote, mechanical, unreflective, disconnected execution of sundry cognitive processes. They caution not to lose sight of the whole while attempting to attend well to its many parts.

RECOMMENDATION 1: All CT instruction should aim at developing good critical thinkers -- persons who can integrate successful execution of various skills in the CT enhanced classroom with the confidence, inclination and good judgment to use these powerful tools in their other studies and in their everyday lives. Persons who have proficiency in CT skills but fail to use them appropriately are most unlikely to be regarded as good critical thinkers.

RECOMMENDATION 2: Those who seek to infuse CT into the educational system to be guided by a holistic conceptualization of what it means to be a good critical thinker. That some aspects of CT, particularly features within its skill dimension, are more readily targeted by existing educational assessment strategies should not distort the conceptualization of CT nor truncate full-blown CT instruction.

The experts characterize certain cognitive skills as *central* or *core* CT skills. The more one achieves proficiency in these skills, the more worthy one is of being regarded as adept at CT. The experts are not, however, saying that a person must be proficient at every skill to be perceived as having CT ability. Considering the panel's purposes and methodology, trying to analyze CT in terms of necessary and sufficient conditions would have had strong negative utility. Thus, in view of the

precision which the question permits, the panel, early in the Delphi process, decided to strive for a consensus on the *core* skills. The panel was not asked to name skills without which a person is surely not a critical thinker.

Responses to Rounds 4 and 5A reveal the experts to be virtually unanimous (N>95%) on including analysis, evaluation, and inference as central to CT. But in response to Round 6 one assessment expert strongly dissented regarding the inclusion of interpretation, arguing that it was properly a part of communication, not CT. The same expert noted that analysis, as defined in this report, overlaps with reading and listening. These points raise obvious difficulties for CT assessment, particularly as one attempts to make finer differentiations between CT and communication or between analysis-in-the-CT-sense and analysis-in-the-reading-sense. Regarding self-regulation the expert said, "I think this is where testing must merge with teaching." In response to Round 6 another assessment expert pointed out that, as compared to the others, self-regulation appears to be a skill of a different kind or level. In self-regulation one applies the other CT skills to one's own CT, by, for example, evaluating one's own inferences. This gives CT an interestingly recursive character. However, as this expert noted, the meta-cognitive aspect of self-regulation makes it extremely difficult to assess using the standard kinds of paper and pencil instruments. Nonetheless, strong consensus (N 87%) exists that interpretation, explanation and self-regulation are central to CT. [For detailed results see the response tables on page 10 of the Delphi letter for Round 5A in Appendix C.]

FINDING: There is consensus that one might improve one's own CT in several ways. The experts agree that one could critically examine and evaluate one's own reasoning processes. One could learn how to think more objectively and logically. One could expand one's repertoire of those more specialized procedures and criteria used in different areas of human thought and inquiry. One could increase one's base of information and life experience.

It was readily apparent that the experts do not regard CT as a body of knowledge to be delivered to students as one more school subject along with others. The panel sees CT, like reading and writing, as having applications in all areas of life and learning. And, as several pointed out, CT instruction, like reading and writing, can occur in programs rich with discipline-specific content or in programs which rely on the events in everyday life as the basis for developing one's CT.

FINDING One implication the experts draw from their analysis of CT skills is this: "while CT skills themselves transcend specific subjects or disciplines, exercising them successfully in certain contexts demands domain-specific knowledge, some of which may concern specific methods and techniques used to make reasonable judgments in those specific contexts."

Although the identification and analysis of CT skills transcend, in significant ways, specific subjects or disciplines, learning and applying these skills in many contexts requires domain-specific knowledge. This domain-specific knowledge includes understanding methodological principles and competence to engage in norm-regulated practices that are at the core of reasonable judgments in those specific-contexts. The explicit mention of "evidential, conceptual, methodological, criteriological, or contextual" considerations in connection with explanation reinforces this point. Too much of value is lost if CT is conceived of simply as a list of logical operations and domain-specific knowledge is conceived of simply as an aggregation of information. Inquiry into the nexus of reasonable judgment and actual application can

produce new appreciations of the necessity of robust concepts of both CT and domain-specific knowledge in education.

> RECOMMENDATION 3: Since becoming adept at CT involves learning to use CT skills effectively in many different contexts, the experts insist that "one cannot overemphasize the value of a solid liberal education to supplement the honing of one's CT skills and the cultivating of one's CT dispositions."

The experts caution that CT skills can usefully be grouped and sub-classified in a number of legitimate ways. Hence, the sub-classification which resulted from this Delphi research should not be interpreted as necessarily excluding all others. Indeed, while declaring themselves to be in agreement with this sub-classification, various participating experts have also published their own sub-classifications. There are areas of overlap in the classification system which emerged from the Delphi research. However, while characterizing each skill and sub-skill is important, creating arbitrary differentiations simply to force each and every sub-skill to become conceptually discrete from all the others is neither necessary nor useful. In practical contexts the execution of some skills or sub-skills may presuppose others. Thus, order of the Delphi listing is not intended to imply the endorsement of any psychological, logical or epistemological order or skill-sequence, nor as prescribing any educational taxonomy or skill-hierarchy.

Table 3 lists the skills and sub-skills which the experts identify as being at the core of CT. No claim is being made that the list exhausts the concept of CT in either breadth or detail. Beyond their inclusion in CT, many of the skills and sub-skills identified are valuable, if not vital, for other important activities, such as communicating effectively. Also CT skills can be applied in concert with other technical or interpersonal skills to any number of specific

concerns such as programming computers, defending clients, developing a winning sales strategy, managing an office, or helping a friend figure out what might be wrong with his car. In part this is what the experts mean by characterizing these CT skills as *pervasive* and *purposeful*. It is also fair to say that a particular skill, such as evaluation, or a particular sub-skill, such as developing reasons, is essential for success in a given endeavor, such as properly diagnosing illness. The experts are not concerned that various skills and sub-skills are widely used. It is not a problem that the skills might be essential elements in other endeavors. On the contrary, it would be extremely disconcerting if they were not, since the case for infusing CT into the educational system depends on CT's utility across almost all areas of life and learning.

The experts are clear on the point that not every useful cognitive

TABLE 3

CONSENSUS LIST OF CRITICAL THINKING COGNITIVE SKILLS AND SUB-SKILLS

1. Interpretation	* Categorization * Decoding Significance * Clarifying Meaning
2. Analysis	* Examining Ideas * Identifying Arguments * Analyzing Arguments
3. Evaluation	* Assessing Claims * Assessing Arguments
4. Inference	* Querying Evidence * Conjecturing Alternatives * Drawing Conclusions
5. Explanation	* Stating Results * Justifying Procedures * Presenting Arguments
6. Self-Regulation	* Self-examination * Self-correction

process should be thought of as CT. Not every valuable thinking skill is CT skill. CT is one among a family of closely related forms of higher-order thinking, along with, for example, problem-solving, decision making, and creative thinking. Unfortunately the conceptual overlaps and complex relationships among all the various forms of higher-order thinking have yet to be examined satisfactorily. However, that does not imply that one cannot develop a careful and accurate conceptualization of the target, CT -- a conceptualization fully adequate to its purpose, which is to guide CT assessment and instruction.

In addition to accord on the listings in Table 3, the Delphi experts find remarkable consensus on the descriptions of each of the skills and sub-skills. These descriptions are presented in Table 4. The examples associated with each sub-skill are intended as clarifications. Some readers might see in them suggestions of possible instructional or assessment strategies. Others might see in them the tools to initiate staff development conversations about the curricular implications. However, the panel's consensus has to do with the skill and sub-skill descriptions, and does not necessarily extend to the examples.

TABLE 4

CONSENSUS DESCRIPTIONS OF CORE CT SKILLS AND SUB-SKILLS

1. **INTERPRETATION**: To comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures or criteria.

1.1 **CATEGORIZATION**:

* to apprehend or appropriately formulate categories, distinctions, or frameworks for understanding, describing or characterizing information.

* to describe experiences, situations, beliefs, events, etc. so that they take on comprehensible meanings in terms of appropriate categorizations, distinctions, or frameworks.

For example: to recognize a problem and define its character

without prejudice to inquiry; to determine a useful way of sorting and sub-classifying information; to make an understandable report of what one experienced in a given situation; to classify data, findings or opinions using a given classification schema.

1.2 DECODING SIGNIFICANCE:

* to detect, attend to, and describe the informational content, affective purport, directive functions, intentions, motives, purposes, social significance, values, views, rules, procedures, criteria, or inferential relationships expressed in convention-based communication systems, such as in language, social behaviors, drawings, numbers, graphs, tables, charts, signs and symbols.

For example: to detect and describe a person's purposes in asking a given question; to appreciate the significance of a particular facial expression or gesture used in a given social situation; to discern the use of irony or rhetorical questions in debate; to interpret the data displayed or presented using a particular form of instrumentation.

1.3 CLARIFYING MEANING:

* to paraphrase or make explicit, through stipulation, description, analogy or figurative expression, the contextual, conventional or intended meanings of words, ideas, concepts, statements, behaviors, drawings, numbers, signs, charts, graphs, symbols, rules, events or ceremonies.

* to use stipulation, description, analogy or figurative expression to remove confusing, unintended vagueness or ambiguity, or to design a reasonable procedure for so doing.

For example: to restate what a person said using different words or expressions while preserving that person's intended meanings; to find an example which helps explain something to someone; to develop a distinction which makes clear a conceptual difference or removes a troublesome ambiguity.

2. **ANALYSIS**: To identify the intended and actual inferential relationships among statements, questions, concepts, descriptions or other forms of representation intended to express beliefs, judgments, experiences, reasons, information, or opinions.

2.1 EXAMINING IDEAS:

* to determine the role various expressions play or are intended to play in the context of argument, reasoning or persuasion.

* to define terms.

* to compare or contrast ideas, concepts, or statements.

* to identify issues or problems and determine their component parts, and also to identify the conceptual relationships of those parts to each other and to the whole.

For example: to identify a phrase intended to trigger a sympathetic emotional response which might induce an audience to agree with an opinion; to examine closely related proposals

regarding a given problem and to determine their points of similarity and divergence; given a complicated assignment, to determine how it might be broken up into smaller, more manageable tasks; to define an abstract concept.

2.2 DETECTING ARGUMENTS:

* given a set of statements, descriptions, questions or graphic representations, to determine whether or not the set expresses, or is intended to express, a reason or reasons in support of or contesting some claim, opinion or point of view.

For example, given a paragraph, determine whether a standard reading of that paragraph in the context of how and where it is published, would suggest that it presents a claim as well as a reason or reasons in support of that claim; given a passage from a newspaper editorial, determine if the author of that passage intended it as an expression of reasons for or against a given claim or opinion; given a commercial announcement, identify any claims being advanced along with the reasons presented in their support.

2.3 ANALYZING ARGUMENTS:

* given the expression of a reason or reasons intended to support or contest some claim, opinion or point of view, to identify and differentiate: (a) the intended main conclusion, (b) the premises and reasons advanced in support of the main conclusion, (c) further premises and reasons advanced as backup or support for those premises and reasons intended as supporting the main conclusion, (d) additional unexpressed elements of that reasoning, such as intermediary conclusions, unstated assumptions or presuppositions, (e) the overall structure of the argument or intended chain of reasoning, and (f) any items contained in the body of expressions being examined which are not intended to be taken as part of the reasoning being expressed or its intended background.

For example: given a brief argument, paragraph-sized argument, or a position paper on a controversial social issue, to identify the author's chief claim, the reasons and premises the author advances on behalf of that claim, the background information used to support those reasons or premises, and crucial assumptions implicit in the author's reasoning; given several reasons or chains of reasons in support of a particular claim, to develop a graphic representation which usefully characterizes the inferential flow of that reasoning.

3. **EVALUATION**: To assess the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intend inferential relationships among statements, descriptions, questions or other forms of representation.

3.1 ASSESSING CLAIMS:

* to recognize the factors relevant to assessing the

degree of credibility to ascribe to a source of information or opinion.

* to assess the contextual relevance of questions, information, principles, rules or procedural directions.

* to assess the acceptability, the level of confidence to place in the probability or truth of any given representation of an experience, situation, judgment, belief or opinion.

For example: to recognize the factors which make a person a credible witness regarding a given event or credible authority on a given topic; to determine if a given principle of conduct is applicable to deciding what to do in a given situation; to determine if a given claim is likely to be true or false based on what one knows or can reasonably find out.

3.2 ASSESSING ARGUMENTS:

* to judge whether the assumed acceptability of the premises of a given argument justify one's accepting as true (deductively certain), or very probably true (inductively justified), the expressed conclusion of that argument.

* to anticipate or to raise questions or objections, and to assess whether these point to significant weakness in the argument being evaluated.

* to determine whether an argument relies on false or doubtful assumptions or presuppositions and then to determine how crucially these affect its strength.

* to judge between reasonable and fallacious inferences;

* to judge the probative strength of an argument's premises and assumptions with a view toward determining the acceptability of the argument.

* to determine and judge the probative strength of an argument's intended or unintended consequences with a view toward judging the acceptability of the argument;

* to determine the extent to which possible additional information might strengthen or weaken an argument.

For example: given an argument to judge if its conclusion follows either with certainty or with a high level of confidence from its premises; to check for identifiable formal and informal fallacies; given an objection to an argument to evaluate the logical force of that objection; to evaluate the quality and applicability of analogical arguments; to judge the logical strength of arguments based on hypothetical situations or causal reasoning; to judge if a given argument is relevant or applicable or has implications for the situation at hand; to determine how possible new data might lead logically to the further confirmation or disconfirmation of a given opinion.

4: **INFERENCE**: To identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to educe the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation.

4.1 QUERYING EVIDENCE:

* in particular, to recognize premises which require support and to formulate a strategy for seeking and gathering information which might supply that support.

* in general, to judge that information relevant to deciding the acceptability, plausibility or relative merits of a given alternative, question, issue, theory, hypothesis, or statement is required, and to determine plausible investigatory strategies for acquiring that information.

> For example: when attempting to develop a persuasive argument in support of one's opinion, to judge what background information it would be useful to have and to develop a plan which will yield a clear answer as to whether or not such information is available; after judging that certain missing information would be germane in determining if a given opinion is more or less reasonable than a competing opinion, to plan a search which will reveal if that information is available.

4.2 CONJECTURING ALTERNATIVES:

* to formulate multiple alternatives for resolving a problem, to postulate a series of suppositions regarding a question, to project alternative hypotheses regarding an event, to develop a variety of different plans to achieve some goal.

* to draw out presuppositions and project the range of possible consequences of decisions, positions, policies, theories, or beliefs.

> For example: given a problem with technical, ethical or budgetary ramifications, to develop a set of options for addressing and resolving that problem; given a set of priorities with which one may or may not agree, to project the difficulties and the benefits which are likely to result if those priorities are adopted in decision making.

4.3 DRAWING CONCLUSIONS:

* to apply appropriate modes of inference in determining what position, opinion or point of view one should take on a given matter or issue.

* given a set of statements, descriptions, questions or other forms of representation, to educe, with the proper level of logical strength, their inferential relationships and the consequences or the presuppositions which they support, warrant, imply or entail.

* to employ successfully various sub-species of reasoning, as for example to reason analogically, arithmetically, dialectically, scientifically, etc.

* to determine which of several possible conclusions is most strongly warranted or supported by the evidence at hand, or which should be rejected or regarded as less plausible by the information given.

> For example: to carry out experiments and to apply appropriate statistical inference techniques in order to confirm or disconfirm an empirical hypothesis; given a controversial issue to examine

informed opinions, consider various opposing views and the reasons advanced for them, gather relevant information, and formulate one's own considered opinion regarding that issue; to deduce a theorem from axioms using prescribed rules of inference.

5: **EXPLANATION**: To state the results of one's reasoning; to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological and contextual considerations upon which one's results were based; and to present one's reasoning in the form of cogent arguments.

5.1 STATING RESULTS:

* to produce accurate statements, descriptions or representations of the results of one's reasoning activities so as to analyze, evaluate, infer from, or monitor those results.

For example: to state one's reasons for holding a given view; to write down for one's own future use one's current thinking about an important or complex matter; to state one's research findings; to convey one's analysis and judgment regarding a work of art; to state one's considered opinion on a matter of practical urgency.

5.2 JUSTIFYING PROCEDURES:

* to present the evidential, conceptual, methodological, criteriological and contextual considerations which one used in forming one's interpretations, analyses, evaluation or inferences, so that one might accurately record, evaluate, describe or justify those processes to one's self or to others, or so as to remedy perceived deficiencies in the general way one executes those processes.

For example: to keep a log of the steps followed in working through a long or difficult problem or scientific procedure; to explain one's choice of a particular statistical test for purposes of data analysis; to state the standards one used in evaluating a piece of literature; to explain how one understands a key concept when conceptual clarity is crucial for further progress on a given problem; to show that the prerequisites for the use of a given technical methodology have been satisfied; to report the strategy used in attempting to make a decision in a reasonable way; to design a graphic display which represents the quantitative or spatial information used as evidence.

5.3 PRESENTING ARGUMENTS:

* to give reasons for accepting some claim.

* to meet objections to the method, conceptualizations, evidence, criteria or contextual appropriateness of inferential, analytical or evaluative judgments.

For example: to write a paper in which one argues for a given position or policy; to anticipate and to respond to reasonable criticisms one might expect to be raised against one's political views; to identify and express evidence and counter-evidence intended as a dialectical contribution to one's own or another person's thinking on a matter of deep personal concern.

6: **SELF-REGULATION**: Self-consciously to monitor one's cognitive activities, the elements used in those activities, and the results educed, particularly by applying skills in analysis and evaluation to one's own inferential judgments with a view toward questioning, confirming, validating, or correcting either one's reasoning or one's results.

6.1 SELF-EXAMINATION:

* to reflect on one's own reasoning and verify both the results produced and the correct application and execution of the cognitive skills involved.
* to make an objective and thoughtful meta-cognitive self-assessment of one's opinions and reasons for holding them.
* to judge the extent to which one's thinking is influenced by deficiencies in one's knowledge, or by stereotypes, prejudices, emotions or any other factors which constrain one's objectivity or rationality.
* to reflect on one's motivations, values, attitudes and interests with a view toward determining that one has endeavored to be unbiased, fair-minded, thorough, objective, respectful of the truth, reasonable, and rational in coming to one's analyses, interpretations, evaluations, inferences, or expressions.

For example: to examine one's views on a controversial issue with sensitivity to the possible influences of one's personal bias or self-interest; to review one's methodology or calculations with a view to detecting mistaken applications or inadvertent errors; to reread sources to assure that one has not overlooked important information; to identify and review the acceptability of the facts, opinions or assumptions one relied on in coming to a given point of view; to identify and review one's reasons and reasoning processes in coming to a given conclusion.

6.2 SELF-CORRECTION:

* where self-examination reveals errors or deficiencies, to design reasonable procedures to remedy or correct, if possible, those mistakes and their causes.

For example: given a methodological mistake or factual deficiency in one's work, to revise that work so as to correct the problem and then to determine if the revisions warrant changes in any position, findings, or opinions based thereon.

IV -- The Dispositional Dimension of Critical Thinking

As is evident, particularly in the descriptions of self-examination and self-correction, there are dispositional components to critical thinking. Indeed each cognitive skill, if it is to be exercised appropriately, can be correlated with the cognitive disposition to do so. In each case a person who is proficient in a given skill can be said to have the aptitude to execute that skill, even if at a given moment the person is not using the skill. But there was a great deal more many experts wished say in regard to the personal traits, habits of mind, attitudes or affective dispositions which seem to characterize good critical thinkers.

> FINDING: Although the language here is metaphorical, one would find the panelists to be in general accord with the view that there is a critical spirit, a probing inquisitiveness, a keenness of mind, a zealous dedication to reason, and a hunger or eagerness for reliable information which good critical thinkers possess but weak critical thinkers do not seem to have. As water strengthens a thirsty plant, the affective dispositions are necessary for the CT skills identified to take root and to flourish in students.

> RECOMMENDATION 4: Modeling that critical spirit, awakening and nurturing those attitudes in students, exciting those inclinations and attempting to determine objectively if they have become genuinely integrated with the high quality execution of CT skills are, for the majority of panelists, important instructional goals and legitimate targets for educational assessment. However, the experts harbor no illusions about the ease of designing appropriate instructional programs or assessment tools.

Procedural, Laudatory and Normative Uses of the Term "CT"

The experts have a consensus regarding the list of affective dispositions which characterize good critical thinkers. This consensus is expressed in Table 5. However, whether or not these affective dispositions are part of the meaning of "CT" in the way that the cognitive skills are, was an issue which divided the experts from the first. It became evident

that various experts mean different things when they used the term "CT" in reference to its possible dispositional components.

The deepest division is between the nearly two-thirds majority who hold that the term "CT" includes in its meaning a reference to certain affective dispositions and the roughly one-third minority who hold that "CT" refers only to cognitive skills and dispositions, but not to affective dispositions. The project director put this issue to the panel in several different ways, sometimes directly and at other times more obliquely. Responses, comments and arguments were shared, as were the objections and counter-arguments which they engendered. In the end the panel remained divided both numerically and in depth of feeling, with opposing positions becoming more strident and entrenched as the debate continued.

In Round 5B, of those expressing an opinion, the majority (61%) maintain that the affective dispositions constitute part of the meaning of "CT." They argue that these dispositions flow from, and are implied by, the very concept of CT, much as the cognitive dispositions are. These experts argue that being adept at CT skills but habitually not using them appropriately disqualifies one from being called a critical thinker at all. Thus, in addition to using "CT" in its procedural sense, these panelists also use "CT" in its *laudatory* sense. They find it sensible to say, "This person is a critical thinker, but this other person is so mentally lazy, close-minded, unwilling to check the facts and unmoved by reasonable arguments that we simply cannot call him a critical thinker."

The laudatory use of "CT" can suggest approval of how well a person applies her CT skills or it can convey praise for the person because the person has the proper affective dispositions. While the two-thirds majority was eloquent regarding the importance of finding ways to instill affective dispositions in students, in the final analysis they were unable

to persuade the other third of their expert colleagues to view these dispositions as essential to the concept of CT. The majority was, however, persuasive in bringing about virtual unanimity regarding using the affective dispositions to describe the paradigm critical thinker. (See Table 1.)

In Round 5B a minority (30%) insist on using "CT" in a strict *procedural* sense, that is as referring only to a certain judgmental process. They distinguish sharply between what is true of critical *thinking* from what is true of good critical *thinkers*. Their primary concern is with the CT skills. They argue that good critical thinkers are people who have those skills and certain valuable habits as well. If they are <u>good</u> critical thinkers, then they use their CT skills appropriately because <u>good</u> critical thinkers also have some or all of the affective dispositions listed in Table 5. But those dispositions are not what is meant by "CT." They argue that one would not want to say a sophist is not a critical thinker simply because the sophist uses CT skills for deceptive or self-interested ends. The sophist, they would maintain, is a critical thinker -- but not an good one (in an ethical sense). The strict proceduralists do not find it sensible deny that a person is a critical thinker simply because the person, while skilled in CT, fails to check the credibility of sources, gives up too soon when asked to work a challenging problem, lacks confidence in using reason to approach everyday problems, or ignores painful facts. These experts hold that such a person, because of his CT skills, should be called a critical thinker -- but not a good one, (in terms of his effective use of those skills).

As suggested above, there are two senses of the term "good" which might be operating when one uses the phrase "good critical thinker." One sense applies to the thinker's effectiveness and responds to the question,

"How well is this person using CT?" The second sense applies to the thinker's morality and responds to the question, "Is this person's use of CT ethical?" In order to clarify which sense of "good" the experts wished to convey, Round 4 asked the panel to respond to a proposal that CT might have a normative dimension in addition to a skill dimension and a affective dispositional dimension.

FINDING: The mistaken notion that CT has a normative component is rejected by the expert panelists. It is an inappropriate use of the term to deny that someone is engaged in CT on the grounds that one disapproves ethically of what the person is doing. What "CT" means, why it is of value, and the ethics of its use are best regarded as three distinct concerns.

The majority of experts (52%) forcefully reject the proposed *normative* use of "CT." They hold that it is one thing to say what something is, and another thing to say how it ought to be used. A person's skills and attitudes are what they are, even if the person suffers from certain ethical inadequacies.

Only a small group (17%), argue in favor of using "CT" in a normative sense. This minority of experts, all of whom also use "CT" in its commonly understood laudatory sense, hold that the true meaning of "CT" extends to a certain set of ethical norms and social values. For example, they would be willing to say that a defense attorney who uses CT skills to cause a mistrial or win acquittal for a guilty client ought not be dignified with the title of critical thinker. By the same token, the prosecutor who uses CT skills to contrive a way to mislead a gullible jury into convicting and punishing an innocent person is not a critical thinker. Since neither sufficiently value truth and since both appear to lack the moral fiber to eschew deliberate deception in the practice of their socially important professions, neither attorney should be accorded

the moral approval which calling them critical thinkers would imply.

The debate turned out to be instructive in another way as well. The consensus (74% in support and 4% opposed) was that this report should express the experts' fullest support and appreciation of the immense personal and social importance of CT.

The panel shares a solid consensus about the importance of CT as a tool of inquiry, as a liberating force in education, as a powerful resource in one's personal life, and as a vital component in a rational democratic society. It is extremely unlikely that any panelist would condone using CT for immoral, deceptive, or unjust purposes. However the personal and civic value of CT and sensitivity to the morality of its use are not acceptable grounds for building a normative dimension into the meaning of the term "CT". Some even saw such an effort as misguided and potentially destructive of the CT movement. Giving "CT" a normative twist could, they argue, lead to unwarranted limitations on open inquiry and to unjustifiable ideological restrictions on the very concept of being a "thinking" person. The totalitarian specter this conjures up is the antithesis of the liberating critical spirit described earlier.

Dispositions of the Good Critical Thinker

FINDING: To the experts, a good critical thinker, the paradigm case, is habitually disposed to engage in, and to encourage others to engage in, critical judgment. She is able to make such judgments in a wide range of contexts and for a wide variety of purposes. Although perhaps not always uppermost in mind, the rational justification for cultivating those affective dispositions which characterize the paradigm critical thinker are soundly grounded in CT's personal and civic value. CT is known to contribute to the fair-minded analysis and resolution of questions. CT is a powerful tool in the search for knowledge. CT can help people overcome the blind, sophistic, or irrational defense of intellectually defective or biased opinions. CT promotes rational autonomy, intellectual freedom and the objective,

reasoned and evidence-based investigation of a very wide range of personal and social issues and concerns.

Thus, in addition to possessing CT skills the good critical thinker can be characterized by certain affective dispositions or habits of mind. These dispositions, listed in Table 5 below, flow from two sources: characteristics which the experts judge to hold true of good critical thinkers, and the affective dispositions the experts judge to be part of CT in its fullest realization. The majority of the experts (61%) regard the dispositions listed in Table 5 as part of the conceptualization of CT. A consensus exists (83% in favor) that good critical thinkers can be characterized as exhibiting these dispositions.

TABLE 5
AFFECTIVE DISPOSITIONS OF CRITICAL THINKING

APPROACHES TO LIFE AND LIVING IN GENERAL:

* inquisitiveness with regard to a wide range of issues,
* concern to become and remain generally well-informed,
* alertness to opportunities to use CT,
* trust in the processes of reasoned inquiry,
* self-confidence in one's own ability to reason,
* open-mindedness regarding divergent world views,
* flexibility in considering alternatives and opinions,
* understanding of the opinions of other people,
* fair-mindedness in appraising reasoning,
* honesty in facing one's own biases, prejudices, stereotypes, egocentric or sociocentric tendencies,
* prudence in suspending, making or altering judgments,
* willingness to reconsider and revise views where honest reflection suggests that change is warranted.

APPROACHES TO SPECIFIC ISSUES, QUESTIONS OR PROBLEMS:

* clarity in stating the question or concern,
* orderliness in working with complexity,
* diligence in seeking relevant information,
* reasonableness in selecting and applying criteria,
* care in focusing attention on the concern at hand,
* persistence though difficulties are encountered,
* precision to the degree permitted by subject and circumstances.

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The experts are not saying that a person whose metaphysical, epistemological, political, cultural or religious view of the world is different from one's own is, *ipso facto*, not a good critical thinker. Beliefs are not atoms each of which is at any moment subject to being reconsidered independently. Beliefs form intricately interconnected systems of thought. To focus critical attention on any of them, particularly those more central or fundamental to one's own view of the world, can cause reverberations throughout one's entire belief system. Thus in advocating CT the panelists are not urging ideological conformity. Indeed, just as many experts argued that an over-emphasis on the values of CT could lead to trouble, others warn that an over-emphasis on the skills dimension of CT to the exclusion of the affective dispositions might have the unfortunate result of making some students close-minded, intellectually inflexible and dogmatic.

> RECOMMENDATION 5: Just as with the cognitive dimension of CT, when conceiving of the education or assessment of critical thinkers, it is important to consider ways of developing materials, pedagogies, and assessment tools that are effective and equitable in their focus on these affective dispositions. The cultivation of these dispositions is particularly important to insure the use of CT skills outside the narrow instructional setting. Persons who have developed these affective dispositions are much more likely to apply their CT skills appropriately in both their personal life and their civic life than are those who have mastered the skills but are not disposed to use them.

As with the listing of cognitive skills earlier, the panel does not intend that each disposition be considered a necessary condition. The experts are characterizing the ideal. In setting forth the concept of the paradigm critical thinker, they intend to express a goal toward which all might strive. These virtues require a measure of maturity and personal development not commonly found in college sophomores or twelfth graders. Yet to delay embarking on the practices and disciplines which

will lead to these virtues would be an even more profound mistake.

RECOMMENDATION 6: From early childhood people should be taught, for example, to reason, to seek relevant facts, to consider options, and to understand the views of others. It is neither impractical nor unreasonable to demand that the educational system teach young people the habits of mind which characterize the good critical thinker, reinforce those practices, and move students well down the path toward their attainment.

V -- Further Recommendations on CT Instruction and Assessment

Several pedagogical and assessment implications follow from the dispositional dimension of CT, implications which might not be apparent if educators focused only on the skill dimension of CT. The education of good critical thinkers is more than training students to execute a set of cognitive skills. For example, in terms of pedagogy, modeling how to evaluate critically that information which students would normally accept uncritically and encouraging them to do the same can do wonders for developing their confidence in their CT ability. With this confidence students are much more likely to try thinking for themselves. Just as instruction should not focus on skills only, assessment which focus on skills only may give a misleading or incomplete picture of someone's strengths as a critical thinker.

The CT Goal

RECOMMENDATION 7: Because CT helps students with a wide range of educational, personal and civic concerns in a rational way, the academic goal of CT instruction, regardless of the educational level, should be furthering students in the development of their CT cognitive skills and affective dispositions.

TABLE 6
CONSENSUS STATEMENT ON TEACHING AND ASSESSING CT SKILLS

A CT skill, like any skill, is the ability to engage in an activity, process or procedure. In general, having a skill includes being able to do the right thing at the right time. So, being skilled at CT involves knowing, perhaps implicitly or without the ability to articulate this knowledge, both a set of procedures and when to apply those procedures. Being skilled also involves having some degree of proficiency in executing those procedures and being willing to do so when appropriate. Reflecting on and improving one's CT skills involves judging when one is or is not performing well, or as well as possible, and considering ways of improving one's performance. Learning CT involves acquiring the ability to make such self-reflective judgments.

Skills, particularly CT cognitive skills, can be taught in a variety of ways, such as by making the procedures explicit, describing how they are to be applied and executed, explaining and modeling their correct use, and justifying their application. Teaching cognitive skills also involves exposing learners to situations where there are good reasons to exercise the desired procedures, judging their performance, and providing the learners with constructive feedback regarding both their proficiency and ways to improve it. Instruction might start with situations that are artificially simple, but should culminate in situations that are realistically complex. Particularly in the case of CT, the learners must contribute a solid measure of personal effort, attention, practice, desire, and, as they learn how, self-monitoring. Teaching skills involves motivating learners to achieve higher levels of proficiency and, particularly in the case of CT, independence. It also involves coaching learners on how they can achieve those goals.

In theory there are several ways persons can be judged to be more or less proficient in a given CT skill or at the integrated use of related CT skills. One way is to observe a person over time performing those activities, processes or procedures generally regarded as presupposing that skill for proper execution. One then makes a judgment regarding the degree to which the person possesses the general skill in question. A second way is to compare the outcomes (if any) that result from executing a given skill against some set of criteria. A third way is to query persons and receive their descriptions of the procedures and judgments they are using as they exercise that skill, would use if they were to perform that skill, or did use when they performed that skill. A fourth way is to compare the outcomes (if any) that result from performing another task against some set of criteria, where the performance of that other task has been shown to correlate strongly with exercising the skill of interest. However, that such correlations exist between any other task and CT, or any of its sub-skills, has yet to be established in the research literature.

Each of the four ways of CT assessment has limitations as well as strengths. No matter which ways are used, it is important to ensure that the assessment conditions foster an attitude in which the subjects are disposed to use their skills as well as they can, and are not constrained or inhibited from doing so. In our view it is highly advantageous to gather evidence regarding CT performance in many situations, using several assessment methods, so as to compile a composite picture of the subject and to cross check the results of any one way of assessment.

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Either to transform CT into one subject field among others, or to narrow the range of CT applications strictly to domain-specific subject content, would be to truncate its utility, misapprehend its nature and diminish its value. Within the overall curriculum the goal of learning CT can be clearly distinguished from the goal of learning domain-specific content. And yet, while these two goals can be distinguished, the experts do not wish to deny one of the best ways to learn CT is within a subject context.

RECOMMENDATION 8: Direct instruction in CT and assessment of CT should be an explicit parts of any course granted approval for purposes of satisfying CT requirements, whether that course is a CT course *per se* or a course in a given subject field. The primary academic criterion in the evaluation of a proposed instructional program for purposes of achieving the CT goal should be whether the program will further the development of students' CT skills and dispositions.

The CT Curriculum

Given that CT has, in many cases, become a college general education requirement, secondary schools can be expected to begin to develop college preparatory CT programs. However, the value of CT extends well beyond its importance as a university-level inquiry tool. CT is vitally important in the personal and civic life of all members of society. A significant percentage of the citizenry will not graduate from high school, or if they graduate, will not have the benefit of post-secondary education.

RECOMMENDATION 9: Thus, CT instruction should not be reserved only for those who plan to attend college. Nor should it be deferred until college, since it is not likely to be effective if it were.

RECOMMENDATION 10: Explicit attention to the fostering of CT skills and dispositions should be made an instructional goal at all levels of the K-12 curriculum. The cultivation of CT dispositions and an insistence on giving and evaluating reasons, should be an integral part of elementary school education. In middle schools and high schools,

instruction on various aspects and applications of CT should be integrated into all subject area instruction. Specific courses in CT and an advanced placement examination program in CT for college bound students should be developed. Although for good reasons at the post-secondary level CT programs are generally associated with departments of philosophy, no academic unit should be restricted in principle from participating in an institution's CT program, provided that the overall institutional program in CT equips students to apply CT to a broad range of educational, personal and civic subjects, issues and problems.

There is growing evidence of the successes, both scientific and economic, of those industrialized democracies which emphasize demanding academic assessment and set firm educational standards for career and professional advancement. Assessment that counts is unquestionably a key factor in promoting academic achievement.

RECOMMENDATION 11: Thus, minimum CT proficiency expectations should be set for each educational level, including promotion in grade, high school graduation, college entrance, and graduate school admission.

The CT Assessment

The development of valid and reliable assessment strategies from which teachers can draw reasonable inferences about students' CT, in contrast to their domain-specific knowledge or other academic abilities (such as reading or writing), is essential. CT assessment strategies, whether for use in the individual classroom or for broader purposes, must not simply reward arriving at correct answers. They must, however recognize achieving correct answers by way of good CT. The challenge of CT assessment is not to let what is easily measured restrict our sense of the fullness of CT. It would be shameful if those assessment instruments which focus only on CT skills drove our CT curricular design and caused the dispositional components of good CT to be neglected.

RECOMMENDATION 12: In evaluating the acceptability of a CT assessment strategy or instrument one should consider content validity, construct validity, reliability, and fairness.

(1) Content Validity: The strategy or instrument should be based on an appropriate conceptualization of CT and a clear understanding of which aspects of CT the assessment targets. Each task or question should be evaluated to insure that correctly responding to that item is not a matter of rote learning or information recall. Whether for the classroom or for broader educational purposes, CT assessment should include strategies for targeting CT's dispositional dimension as well as its cognitive skills dimension.

(2) Construct Validity: In acceptable CT assessment each task or question should have been evaluated to insure that students who answer correctly do so on the basis of good CT and that inadequate or wrong responses are the result of weak or inadequate CT. Entire strategies or specific items on which good CT leads to wrong answers, or poor CT to right answers, should not be used.

(3) Reliability: In acceptable CT assessment each task or question should have been evaluated to insure that good critical thinkers generally do better on that item than weak critical thinkers. If different persons are involved in evaluating the results, for example grading essays or judging presentations, the evaluations of the different judges should be cross-checked to assure that their findings are reliable, that is, generally consistent with one another. However, it is an open question whether the levels of achievement associated with the different CT sub-skills and affective dispositions are positively correlated. Empirical research on how the sub-skills correlate with each other and with various dispositions has yet to be undertaken. Thus, at this time, due caution should be exercised regarding how to interpret technical measures of test-form reliability in the case of paper and

pencil CT assessment instruments.

(4) Fairness: CT assessment should not unfairly disadvantage or advantage groups of students on the grounds of reading ability, domain-specific knowledge [broadly understood as including the evidential, conceptual, methodological, criteriological, contextual considerations, or familiarity with technical vocabulary], gender or age related life experience, ethnicity or socio-economic status, differences in social norms, or differences in cultural assumptions. CT assessment locates CT tasks and questions in some assumed context, either subject-specific, everyday life, or fictional. Thus, guaranteeing that all students, regardless of their individual backgrounds, will come to the CT assessment on a perfectly equal basis in terms background knowledge, reading ability, life experiences, etc. is impossible. However, examining the assessment strategy or instrument to be sure that these factors do not *unfairly* influence the results is prudent and reasonable. Although one cannot eliminate the influence of these variables, one may be able to neutralize or control for their affects.

The fairness criterion applies both to discipline-neutral and discipline-specific CT assessment. Within curricular programs discipline-specific CT assessment is encouraged, since it is possible for one to be *fair* in one's presumptions regarding subject-specific criteria, concepts, methodologies, evidence, information and terminology. The challenge of such assessment is to factor out the discipline content in order to access the strength or weakness of the CT. It is worth noting that discipline-neutral CT assessment also makes similar assumptions regarding the everyday contexts which form its topic content.

RECOMMENDATION 13: CT assessment should occur frequently, and it should be used diagnostically as well as summatively. Different kinds of

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instruments should be employed, depending on which aspect of CT is being targeted and where students are in their learning -- the introductory stage, the practice stage, the integration stage or the generalized transfer stage. Although the veteran CT instructor is able to assess students continuously, CT assessment should be made explicit to reinforce its worth in the eyes of the students, their families, and the public. It should be made explicit to support the goals of educators seeking to improve the curriculum. And it should be made explicit to properly inform educational policy formation.

The CT Instructor

RECOMMENDATION 14: Teaching CT is most effective if the instructor models CT dispositions and the proper use of CT skills in the very process of instruction. Regardless of the subject area, students should be encouraged to be curious, to raise objections, ask questions, point out difficulties in the instructor's position. These objections and questions should be clarified, interpreted, and examined objectively. Students should be given reasons for doing things a certain way, rather than being dogmatically told how to do them. Instruction should bridge the gap between the subject and the student's own experience. In the case of CT instruction, the topics of discussion should not be restricted to factual matters or academic subjects, but should include issues which have normative, moral, ethical or public policy dimensions.

The *ideal* CT instructor will integrate instruction in CT in a variety of subject areas. She will teach specific CT skills directly using these subjects as content for the application of those skills. She will help students elaborate, transfer and generalize these skills to a variety of contexts. She will create a classroom and school environment which is supportive of CT. She will model CT in her teaching and her interactions with colleagues. She will provide her students with thought-provoking subjects to learn about, and projects to undertake. She will engage students in social activities requiring them to reflect on, articulate, share and discuss justifications, explanations and contrasts in how they executed various CT tasks. She will evaluate each student's progress, achievement or proficiency in CT continuously.

RECOMMENDATION 15: For CT to infuse the K-12 and college curriculum, teacher "training" should give way to teacher "education." If teachers

are to model CT, so must those who have an instructional role in teacher preparation or staff development. In all instruction, and particularly in CT instruction, both faculty and leaders of faculty development should model CT. They should foster the students' confidence in their own powers of reason, rather than dependency on rote learning. They should nurture in students open-mindedness, attention to alternatives, and as much precision of thought as the subject and circumstances permit.

VI -- The Delphi Research Panel

The Delphi research findings reported here result from the participation of forty-six scholars, educators and leading figures in CT theory and CT assessment research. Roughly half the panelists are primarily affiliated academically with Philosophy (52%), the others are affiliated with Education (22%), the Social Sciences (20%), or the Physical Sciences (6%).

It would be a mistake to construe participation in this research project as implying that a person agrees with all the findings. Thus, where consensus is reported a minority of panelists hold divergent views. Where near unanimity is reported a some panelists may may not be in full accord with how the specifics are expressed. In the end, however, after reviewing the draft Delphi findings presented in Round 6, only one of the forty-six explicitly opted to be listed as a participant only, but not as supporting the document.

These Delphi findings fix an important moment in time. It is a moment when the efforts of forty-six experts possessing special experience and knowledge in matters relating to CT converged with a view toward discovering if some measure of general accord could be found. As we move from the successes of the eighties into the decade of the nineties, the persons who participated in this project hope that the findings of expert consensus reported herein will advance critical thinking and help shape the future of CT instruction and CT assessment.

TABLE 7

PARTICIPATING CRITICAL THINKING EXPERTS

Jonathan Adler	Philosophy	Brooklyn College
David Annis	Philosophy	Ball State University
Arnold Arons	Physics	University of Washington
James Bell	Psychology	Howard Community College, MD
Barry K. Beyer	Education	George Mason University
Charles Blatz	Philosophy	University of Toledo
Rob Brady	Philosophy	Stetson University
Neil Browne	Economics	Bowling Green State University
Rex Clemmenson	CT Assessment	American College Testing (ACT)
Arthur L. Costa	Education	Sacramento State University
Stan Dundon	Philosophy	Cal. Polytechnic University, SLO
Robert H. Ennis	Education	University of Illinois
James B. Freeman	Philosophy	Hunter College, CUNY
Jack Furlong	Freshman Studies	Transylvania University
Eugene Garver	Critical Thinking	Saint John's University
H. Scott Hestevold	Philosophy	University of Alabama
David Hitchcock	Philosophy	McMaster University
John Hoaglund	Philosophy	Christopher Newport College
Kenneth Howe	Education	University of Colorado
Ralph H. Johnson	Philosophy	University of Windsor
Stuart Keeley	Psychology	Bowling Green State University
Anthony Lawson	Zoology	Arizona State University
Matthew Lipman	Philosophy	Montclair State College
David S. Martin	Education	Gallaudet University
John Martin	Philosophy	University of Cincinnati
Gary Matthews	Philosophy	U. Massachusetts, Amherst
Stuart Miller	Psychology	Towsen State University
Brooke Noel Moore	Philosophy	CSU Chico
Wayne Neukberger	Assmt. and Eval.	Oregon Department of Education
Stephen Norris	Education	Memorial University of Newfoundland
Richard Parker	Philosophy	CSU, Chico
Richard D. Parry	Philosophy	Agnes Scott College
Richard Paul	Philosophy	Sonoma State University
Philip Pecorino	Social Sciences	Queensborough C. College
William Rapaport	Computer Science	SUNY Buffalo
Pasqual Schievella	Council of Critical Analysis, Port Jefferson, NY	
Zack Seech	Behavioral Science	Palomar College
Anita Silvers	Philosophy	San Francisco State University
Richard Stiggins	Northwest Regional Educational Laboratory, Portland	
Robert J. Swartz	Philosophy	U. Massachusetts, Boston
Steven Tigner	Philosophy	University of Toledo
Carol Tucker	CT Assessment	Educational Testing Service (ETS)
Perry Weddle	Philosophy	Sacramento State University
Robert Wengert	Philosophy	University of Illinois
Mark Weinstein	Institute for CT	Montclair State College
Peter Winograd	Education	University of Kentucky

APPENDIX A

Commercially Available CT Assessment Tools

Prepared for the APA Committee on Pre-College Philosophy
Delphi Research Project on CT Assessment

The Education Testing Service (ETS) Academic Profile Test measures the academic abilities of CT, reading, writing, and using mathematical data, all within the context of three major academic areas -- humanities, social sciences and natural sciences. This is a multiple choice instrument with an optional critical essay (locally scored). It assumes that students have completed most or all of their general education -- that is, completed the sophomore college year.

ETS also has sections targeting logical reasoning and analytical thinking on several of its widely used instruments such as the (a) Law School Admissions Test, (LSAT) "Logical Reasoning" section, (b) Graduate Record Examination, (GRE) -- General Test, the Analytical section, (c) Advanced Placement Test, subject-matter based CT questions, (d) National Assessment of Educational Progress, higher order thinking and laboratory-based questions, (e) Foreign Service Test, in-basket portion, and (f) Graduate Record Examination -- Advanced Test in Philosophy 1972-1982. ETS is adding a section of Critical Reasoning Questions to the Graduate Management Admissions Test (GMAT). ETS has constructed branching tests of information-seeking and decision-making, some paper-and-pencil and some on computers. An example is the clinical practice test prepared for the National Board of Respiratory Care, Shawnee

Mission, Kansas.

Stephen Norris and R. King, through the Institute for Educational Research and Development at Memorial University of Newfoundland, has developed the *Test on Appraising Observations* 1983. Using the backdrop of a common but fictional situation subjects are asked to judge the relative credibility of the claims made by various characters.

The American College Testing Program (ACT) in 1988 produced the "Collegiate Assessment of Academic Proficiency" (CAAP). ACT describes CAAP is designed to measure selected academic skills including reading, writing, mathematics, CT, and scientific reasoning. The CT Test measures the ability to "clarify, analyze, evaluate, and extend arguments." The test is composed of passages commonly encountered in a postsecondary curriculum followed by multiple choice test questions.

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APPENDIX B

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APPENDIX C

The Delphi Research Letters

Over course of this research sixteen "Delphi Letters" were sent to the experts participating in the APA Committee on Pre-College Philosophy Delphi Research Project on CT assessment. Eight letters constituted the specific interactive Delphi research rounds. The eight others were for purposes of planning, clarifying procedures, providing information, and sustaining involvement.

Feb. 11, 1988	ROUND 1
Mar. 1, 1988	Information and Plans
Mar. 14, 1988	ROUND 2
Apr. 14, 1988	Plans and Procedures
May 4, 1988	ROUND 3
May 18, 1988	Procedures and Involvement
June 28, 1988	Information and Involvement
Sept. 1, 1988	Procedures and Information
Sept. 23, 1988	ROUND 4
Nov. 22, 1988	Plans and Involvement
Feb. 7, 1989	Information and Involvement
Feb. 28, 1989	ROUND 5A
Mar. 6, 1989	ROUND 5B
Mar. 10, 1989	ROUND 5C
May 9, 1989	Information and Involvement
Sept. 25, 1989	ROUND 6

California State University, Fullerton
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Department of Philosophy
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Feb. 11, 1988
ROUND 1

Dear Colleague,

Gary Matthews, Chair of the APA Committee on Pre-College Philosophy, asked me to head up an ad hoc committee on testing critical thinking. To get the project rolling he suggested severa names of people interested in the question of how to validly and reliably test critical thinking skills. I added a few more. Here are some of the particulars.

1) By using a modified Delphi approach, I think the necessity for actual meetings can be largely, if not entirely eliminated. Committee members' contributions will involve sending their reasoned and timely responses to questions, given their particular background and expertise.

2) There are, no doubt, a great number of other people who are interested in the question of testing critical thinking and who have valuable expertise which would help us in in dealing with this question. They should also be invited to participate.

3) Since our charge is rather vague, I propose that among the first things we should do is agree on priorities. To do this, using the Delphi process, let me lead off with some assumptions and questions:

First assumption: Most of the members of our group will come at the issue of testing critical thinking with the orientation of philosophers or logicians who teach at the post-secondary level, rather than as K-12 educators, psychologists, or personnel directors (all of whom also have legitimate theoretical and practical interests in assessing critical thinking). Given the interests of the American Philosophical Association, this is acceptable.

Second assumption: Critical thinking can be defined operationally to the extent that it can become a dependent variable in a valid and reliable assessment tool.

QUESTIONS:

1. Do you agree with the two assumptions? How would you amend/clarify them? Why?

2. To which educational level (from Kindergarten through post-Baccalaureate) should the committee give priority? Why so?

3. After looking the attached preliminary list, whom else would you recommend be added to our committee?

For the Delphi process, which is very interactive, to function optimally, reasonably quick turn around is needed. Let's target a Feb. 29 postmark. Is that possible for you?

Please send responses, suggestions, comments, etc. to:

Ad Hoc APA Committee on Critical Thinking Testing
c/o Dr. Peter A. Facione
Professor of Philosophy and Education
Dept. of Philosophy
California State University, Fullerton
Fullerton, CA 92634

Like math and composition, at many colleges throughout the country CT is being built into the curriculum. For example, the California State University system, which enrolls hundreds of thousands of undergraduates, has implemented a system-wide critical thinking requirement as part of its general education package. If those of us who teach critical thinking were able to agree on a way or ways it could be tested, what a positive contribution that could be to the quality of that curriculum.

I sincerely hope you will agree to become an active participant in what promises to be a most interesting and important effort.

I've included some reference material from _The Ninth Mental Measurements Yearbook_ regarding published instruments which purport to measure critical thinking and/or related cognitive skills.

Yours sincerely,

Pete Facione

cc. Gary Matthews, University of Massachusetts, Amherst
Steve Tigner, University of Toledo, Ohio

ATTCHMENTS: Preliminary List of Committee Members
Quick Survey of Published Instruments

TO BE DEVELOPED: Bibliography on Testing Critical Thinking

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March 1, 1988

Dear Colleague,

Early responses to the first Delphi round are very encouraging!

Some of you know what I'm talking about, others, new to the effort, need to be brought up to speed. Let me back track a bit and explain.

I am writing to you because you were nominated by one or more of your colleagues as a person interested in the question of testing critical thinking. You are being invited to participate in the work of an *ad hoc* American Philosophical Association subcommittee concerned with the problem of testing critical thinking. In its boldest form, our aim is to find ways to validly and reliably test critical thinking, or find solid reasons why such a goal is not achievable. Using the Delphi process, I will serve as coordinator of the effort. At the moment we are very near the beginning of Phase 1.

Please review the preliminary plan outlined below and decide to become actively involved in what promises to be an intriguing effort to shed light on an important pedagogical and profession concern.

ad hoc APA Sub-Committee on Testing Critical Thinking

Draft Preliminary Plan

Phase 1: Start the Inquiry
The five objectives of this phase are:

(a) Initiating the Delphi process. This is a method of achieving reasoned consensus among a group of experts with regards to a given problem or issue. The core of the strategy is to make inquiries, gather each expert's responses *and their reasons*, then summarize and share those with the group. After "hearing" what other experts think, people have the opportunity to refine their responses or defend those responses. The interactive rounds continue until reasoned consensus is achieved (or communications break down).

(b) Developing the "List of Experts" who will take part in this inquiry. Many of you were nominated by those who replied to my first letter, (2-11-88). That letter was sent to an original group of about twenty-five experts and interested persons suggested by the APA committee that conceived of this project and asked me to coordinate it. At any time if someone is no longer interested in continuing, just drop me a note. I plan to send out updated rosters of participants periodically. We are now up to fifty.

(c) Developing a bibliography on testing critical thinking. Work on this is progressing well. Many of you have sent me items to include, and I appreciate that. I will send you a copy of the bibliography later this semester.

(d) Planning the subsequent phases in our process of responding to the general question of whether or not critical thinking (whatever CT is) can be validly and reliably tested at some educational level or levels. If the consensus is "Yes, at level X," then we will focus on the question: How? If the consensus is "No, at least not at level X," then we will focus on, "Why not?"

(e) Agreeing on basic assumptions.

In the 2-11-88 letter two assumptions were put to the group:

Assumption #1: "Most of the members of our group [of experts participating in the Delphi process] will come at the issue of testing critical thinking with the orientation of philosophers or logicians who teach at the post-secondary level, rather than as K-12 educators, psychologists, or personnel directors (all of whom also have legitimate theoretical and practical interests in assessing critical thinking). Given the interests of the American Philosophical Association, this [is an] acceptable [orientation]."

Assumption #2: "Critical thinking can be defined operationally to the extent that it can become a dependent variable in a valid and reliable assessment tool."

People were asked (1) if they agreed with the two assumptions as stated, or whether they would reject them or rephrase them somehow. Naturally, people were invited to explain why. They were also asked (2) to identify the educational level (K-post baccalaureate) to which our committee should give priority, and why they would recommend that level.

Both questions have generated controversy, as you will see in my next letter. If you haven't had the opportunity to respond to these questions, you will be invited to respond when the first round of the Delphi is reported back to you. Delphi is not about vote-counting, it aims at reaching agreement on the basis of reasons and common assumptions. In the Delphi method people are supposed to share their premises, not just their conclusions.

As conceived *at the moment*, our work can be divided into 4 phases. These are not in stone! I welcome your suggestions, amendments, alternatives, etc. WE WILL USE THE DELPHI PROCESS TO AGREE ON OUR PLAN OF INQUIRY. Because the plan should be amended as a result of your input, only goals, not detailed objectives, have been developed so far for the next three *proposed* phases.

Phase 2: Define "Critical Thinking"

The goal of this phase is to define "critical thinking" with sufficient clarity and precision to ask and answer the question of whether or not CT can be tested. Is CT fundamentally a set of skills, concepts, procedures, attributes, behaviors, outcomes, dispositions, aptitudes, or what? Even if we cannot reduce CT to an equivalent operational definition, how might we express what CT is with sufficient operational precisions to permit us to justifiably infer things about the relative CT abilities of students?

Phase 3: Recommendations

The goal of this phase is to communicate our findings about what CT is and whether there is an adequate way of characterizing CT operationally so as to permit its being tested as some educational level. Depending on our results in Phase 2, we will recommend either that programs aimed at testing CT be abandoned, or that they be focused in certain ways. If this is the direction Phase 3 takes, then we will also try to come to consensus on recommendations regarding the relative importance of different kinds of CT sub-skills and possible strategies for accessing and measuring those sub-skills.

Phase 4: Design and Validation of Model Testing Strategies

Contingent on the results of earlier phases, the goal, if it were considered achievable in principle, would be to construct and evaluate different approaches to testing CT at some appropriate educational level or levels. We might find ourselves breaking into sub-committees to achieve this goal, although all work will have to be guided by the agreements reached in earlier phases and as well as by the special expertise of those who understand the intricacies of designing, piloting, norming and validating educational tests at specific educational levels.

As I mentioned, you have been nominated as person who might be interested in this project and could make a strong contribution to the work of this *ad hoc* sub-committee. I hope you will agree to participate actively, because, as you must know, the quality and utility of our effort is directly related to the involvement of concerned persons like yourself.

Sincerely,

Pete Facione

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March 14, 1988
ROUND 2

Dear Testing CT Colleagues,

Let's give Phase I, Round 2 a shot!

Thanks for your responses to the first round of questions. Nineteen of the twenty-six or so who received the original 2-11-88 letter for Round 1 were able to respond. Round 2 invites everyone (which now includes just over 50 people) to review the results of Round 1 and comment on the agreements and controversies that are emerging.

Round 1 focused on three issues: (1) The composition of our *ad hoc* committee in view of the interests of the American Philosophical Association, (2) the assumption that critical thinking can be operationally defined, and (3) the educational level to which we should give priority.

In regard to the composition of our committee, we are in decent shape, particularly since our group has been greatly expanded as per your recommendations. In regard to an operational definition of CT, we generally agree on the possibility but many would add various caveats. In regard to the educational level to which we should give priority, we have disagreements.

The following pages cover each of the three questions in turn. You'll find restatements of the original questions and several representative quotes and summaries of your comments. AFTER EACH SUMMARY, A SECOND ROUND QUESTION WILL BE PUT TO YOU. The new questions take the form of stating a position and asking your opinion, now that you have had an opportunity to consider what our colleagues have to say. In all, there are three new questions. IF YOU COULD GET YOUR RESPONSES TO ME WITHIN TEN DAYS OF RECEIVING THIS LETTER, THAT WOULD BE GREAT! (I wish we all had electric mail, or unlimited phone budgets, but...)

Several people noted that our task was huge, yet were willing to give it a try. In contrast, one person wrote a major critique of the entire enterprise. This person argued that trying to test CT was a serious mistake. So that his opinion is not lost in the shuffle, at the end of this package I have provided extensive quotations from his letter. If you find yourself in agreement with his views, then let me know and we will take up any "prior questions" we must. If you don't agree, then we will press on along the path we are charting for ourselves.

Thank you in advance for your participation.

Yours sincerely

PHASE I, ROUND 2, FIRST ISSUE
CURRENT STATUS: CLOSE TO CONSENSUS

COMPOSITION OF THE *AD HOC* COMMITTEE: *We were asked if we agreed with the assumption that, although most of the members of our* ad hoc *committee would come at the issue of testing with the orientation of philosophers or logicians who teach at the college level, this orientation still would be acceptable in terms of the interests of the American Philosophical Association.*

Almost everyone agreed, however some qualified their responses in terms of our collective professional interests and abilities, or in terms of educational level to which we should give priority. Here are representative responses:

"I agree." "I have no problems with this assumption."

"I don't see why this is a problem. First we're concerned about students acquiring the thinking skills required for college work,... Second, we're concerned that they learn the standards of good reasoning; I do not believe we need to know a lot about psychology to achieve this purpose."

"I agree, with reservations. We need to avoid tunnel vision. It is acceptable that most members be philosophers, but there should be a generous sprinkling of 'outsiders' for the insights they will bring and to give our findings greater credibility outside the APA."

"We are what we are! This is an appropriate place *to begin*. We are starting from what we know best and with what we can deal with most easily. This is not to suggest that we shall forever ignore other orientations, or that we really know that we can define all aspects of CT operationally."

"I agree, this is acceptable; but it is unnecessarily narrow. Since so many of the tests are created by cognitive and educational psychologists, I think some of them should be included..."

"It should not be too quickly assumed that those who teach at the post-secondary level are therefore knowledgeable and competent with regard to testing at the elementary school level."

"I agree, but we should make a serious effort to inform ourselves of approaches to CT in pre-college and non-academic settings... Assuming our primary focus is everyday reasoning skills, we should not allow college CT instruction to be fundamentally different from pre-college CT instruction nor to become idiosyncratically colored by our own traditions.

One person disagreed but did not give a reason. And one urged "Pete, get a proof-reader!"

<u>ROUND 2, QUESTION ONE</u>: In view of the above comments, and in view of the additional names added as the result of your recommendations, can we agree that *the* ad hoc *committee, as listed on the attachment, is sufficiently well-constituted for us to move on with our main task?* As you can see, it still has its original orientation toward philosophers teaching at the college level, but it also includes several people from other relevant disciplines backgrounds, including psychology and education.

PHASE I, ROUND 2, ISSUE 2
CURRENT STATUS: AGREEMENT SEEMS ACHIEVABLE

OPERATIONALIZING CRITICAL THINKING: *We were asked if we agreed with the assumption that CT can be defined operationally to the extent that it can become a dependent variable in a valid and reliable assessment tool.*

Here, too, most people agreed and were ready to get on with the work. Yet, some crucial ambiguities, concerns and caveats emerged. Here are some responses.

"I expect we will argue about the details of any definition proposed, but I do not object to the assumption that we shall need some such instrument if we are to get any comparisons of interest."

"This is a tautology because of the *to the extent* phrase. Perhaps this is how we should leave it..."

"Sounds ok. ...I'm not a statistician, so I'm not quite sure what *dependent variable* means -- but if you are asking whether CT can be tested, then, yes, I agree!"

"I don't understand what this assumption is supposed to mean!"

"I would agree only if we amended it to say *at least some components of* CT can be defined operationally to the extent that *they* can become dependent variables in a valid and reliable assessment tool... I do *not* accept as analytic the proposition that CT can be defined operationally... I think some important aspects of CT, such as *making judgment calls* and *weighting nuances* may resist operational definition."

"As the term *operational definition* is generally used by philosophers and education researchers, I do not think CT can be operationally defined... but I do think that part of the operational spirit can be employed in formulating *reduction* sentences (that do not reduce!)."

"I agree, but there will probably have to be a variety of sub-definitions because CT is not one thing, but many. It somewhat resembles IQ in that."

"There are several definitions of CT floating around... Some lend themselves more to operational definition than others.... If we are to get anywhere, we will have to become clear in our own minds as to how CT is to be distinguished from other kinds of thinking..."

"Is this a normative, definitional, conceptual, or planning assumption?"

ROUND 2, QUESTION TWO: Without hanging ourselves up on the word "operations," can we agree that: *(1) Even if CT cannot be reduced entirely to an equivalent set of operations [or performances, behaviors, processes, outcomes, or skills,] (2) it is possible to conceptually analyze CT so as to describe a set of relevant and important CT operations, such that (3) using these descriptions, [competent] investigators could, on a consistent basis, gather sufficient evidence to draw conclusions, with high degrees of confidence, regarding the relative CT abilities of a group of people,* [everything else being equal, of course].

PHASE I, ROUND 2, QUESTION 3
STATUS: CONTROVERSY

PRIORITIES: *We were asked which educational level (kindergarten through post-baccalaureate) should be the priority for our committee. And why so?*

Responses were split. Here are some representative examples:

A person with considerable experience in the area of CT testing wrote: "I think we should concentrate on high school at first. Since this is a subcommittee of the pre-college committee, all [levels] above that [are] ruled out. Furthermore, the younger the population, the more difficult the problems. Let's start with the easiest ones first -- and they are very difficult."

By contrast, it was argued, "Priority should be given to the post-secondary level. One should examine end-products first, and then work backwards if needed. Find out first if the car doesn't run before attempting to determine where the problem is. If a good test of CT revealed no CT deficiencies on the part of graduating seniors -- (no doubt a counter-factual assumption) -- then I would think the APA might not wish to pursue the issue down in K-12."

Noting that we are a *sub-committee of the APA pre-college committee* one person argued: "We *must* give priority to K-12; that is our mission."

However, the person who will assume the chair of the APA pre-college committee for the next three years wrote: "It makes sense to start by playing from the APA membership's greatest experience and strength, which is surely college freshman level logic."

Taking note of the interests of the APA, one person argued, "Since our *ad hoc* committee is convened within the structure of the APA, our focus should perhaps be primarily on the improvement of post-secondary education..." However, this person also suggested, "... that our assessment tool should be usable in secondary schools as well as at the post-secondary level..."

Some people did not offer an opinion, but did note important distinctions. For example: "There are really two areas. One is the whole K-12 integration of thinking skills into the curriculum. The other is the single CT course, typically the approach followed in post-secondary education. The single college CT course offers exceptional opportunities for measuring gains in thinking skills, while the effort to incorporate thinking skills into the [K-12] curriculum may offer much greater potential for actually improving student skills."

Another person, experienced in the pre-college arena, wrote: "It may be necessary to think of four tests, one for grades K-3 (one should not have high expectations for reliability at this level); one for grades 4-8 (the level at which *testing* might have the maximum impact, even though the maximum impact for the *teaching* of CT might be at K-3); one for grades 9-12, and one for 13-16."

Some were tentative: "Perhaps we should give priority to CT at the college level, at least to start with, since the large majority of APA members teach at the college level. Later we might wish to broaden our focus."

ERIC

Some were direct, "College and university level."

Others were focused, but concerned not to overlook anything important, "College level -- but someone ought to look at the high school level."

One person declared for the college freshman level and argued against going any higher saying, "There are few if any thinking skills possessed by people beyond this level not also possessed by well-prepared college freshman. Graduate school and professional life chiefly consists in the ability to persistently apply these skills in more and more recondite subject matters.

Some narrowed the range, but still left us with a choice: "I would say grades 9-12 and freshman/sophomore level in college."

Another argued we should give priority to the introductory baccalaureate level saying, "First, it is the area where most philosophy departments have numerous classes actually being taught. Second, it is taught at a level which will have the most connections in other areas and at other levels."

ROUND 2, QUESTION THREE: To get started *let's give priority to the college freshman/sophomore level*. Do you agree? If not, is your disagreement based on pedagogical and theoretical concerns or on concerns relating to our charge as a sub-committee of the APA committee on pre-college philosophy?

Please try to get your responses to me within ten days. Thanks.

ERIC

PHASE I, A CHALLENGE RAISED AGAINST THE ENTERPRISE

One person wrote: "I would like to comment that teaching CT skills... is a far more significant matter than testing for them. Since CT is not an inherited trait, as is intelligence, the quality and extent of the CT is dependent on and proportional to the degree to which children have learned to, or have been taught to, think critically about their experiences and knowledge.

"Our educational system ... is an abysmal failure. Most students are unable to recognize assumptions, not alone question or examine them. ... With rare exceptions, they show an almost total absence of recognition of even the simplest of logical/mathematical/linguistic/philosophical/scientific facts and concepts needed to be able to think critically. They have been so nurtured in a world of superficial "education" ... that to think of testing them on the basis of that "education" is an exercise in futility or at best an attempt to determine how inadequately they think critically as opposed to how much -- which if taken literally amounts to the same thing.

"I am willing to contribute my expertise to the teaching of CT. I have been doing so for over thirty years. But until I see considerably more evidence of students being able to think critically without such teaching, I see little point in testing them for the insignificant amount of critical acuity they may have acquired haphazardly.

"... Teaching CT must precede and supersede testing for CT. Testing for CT cannot be considered to be an enterprise separate from teaching it. Testing for such skills and concepts presumes prior teaching of them. Psychologists and K-12 teachers as well as other educators show interest in CT. The problem remains, however, that most of them have only superficial, naive, and conflicting concepts, of what critical thinking entails. Even we philosophers can't agree on what it is...

"From my understanding of the term, testing for CT means testing based on what I teach CT is. ... Any tests that I would, and have designed, are predicated upon the version of CT I have taught.

"My comments will undoubtedly reflect those which you will receive from my colleagues equally concerned with the problems facing our educational system, particularly as they relate to the teaching of CT skills and concepts."

REMINDER: If you believe there are issues (suggested by the above or otherwise) which our *ad hoc* sub-committee must address before we can move ahead, please let me know. On the other hand, the above challenge may represent a view which is not widely shared, or may raise questions which, in your view, do not fall within the scope of our work or do not warrant our attention at this time. If that is the case, then, for the present, no response on this item is necessary.

Thanks again for your participation.

Pete

ERIC

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April 14, 1988

Dear Colleagues,

Thanks for your help with the addresses. I also appreciate the notes, suggestions and other helpful comments many of you are sending.

So far 17 responses to Round Two have been received. It would help if we had more, particularly since it there may still be a split over Question Number 3, the one about which level to pursue first. Drop me a note, with your reasons and opinions. Thanks.

One of the responses to Round Two proposed an alternative to actually trying to come up with our own CT assessment instrument -- a goal some of us hope to achieve, but others of us are extremely skeptical about. This person suggested that we articulate the best list of CT skills we can, then let people go their own way with regard to building testing instruments. I'll expand on that idea when I summarize Round Two responses. I mention it here because perhaps we all should be thinking ahead and trying to chart the most reasonable path for ourselves.

Some of you have electronic mail. I don't, at least not yet. So, I'll be using snail mail and telephone to try to reach you for particular questions or clarifications. If you want to phone in your views on the questions in Round Two you can reach me at 714-773-3742 (office) 08:30-10:00 MW or 09:30-11:00 TTh (PDT). If those times are inconvenient, call the department secretary at 714-773-3611 and leave your phone number. I'll get back to you.

I will be attending the First National Conference on Assessing Thinking in Baltimore on May 6 and 7. This conference is sponsored by the Maryland State Department of Education and the Association for Supervision and Curriculum Development. Although plans are to discuss all educational levels, the participating organizations, (over 35 professional associations, centers and government agencies) are concerned primarily with K-12 education in some way or another. I'll report on what promises to be a most interesting gathering.

Within the week you should receive two items interest. One is a partial bibliography CT with emphasis on testing CT, the other is an updated listing of some of the existing tests which purport to measure CT or closely related reasoning skills.

Sincerely,

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Round 3
May 4, 1988

Dear Colleagues,

I hope this letter finds you happy and well. It's time for Round 3 of our Delphi -- the round where we finally get to the heart of the matter: What is CT? Also, for those who are new to our effort, this letter includes a brief overview of who we are and what we are about. The last three pages summarize our Round 2 results. *Please send Round 3 responses by June 25.*

As a result of nominations in Round 1 and Round 2, sixty persons, including some of the most eminent names in the field, are now invited to participate in this effort.

By way of background, in January the American Philosophical Association Committee on Pre-College Philosophy asked me to chair an *ad hoc* sub-committee on *testing critical thinking*. Beginning with an initial group of APA nominees and asking them for additional recommendations, the "sub-committee" has grown to include people from a variety of academic disciplines and professional affiliations. Our unifying concern is in testing CT. However, we do not necessarily share the same conceptualization of what CT is nor do we necessarily agree on how it might best be tested.

It is to resolve precisely these two things that we have undertaken the Delphi process. In Round 1 (Feb. 11, 1988) and Round 2 (Mar. 14, 1988) the focus was on establishing group membership and agreeing on preliminary working assumptions -- such as the assumption that CT could be operationalized to the extent that valid and reliable assessments of important and relevant CT skills could be made. Starting with Round 3 we will focus on what those CT skills are and eventually we will decide on recommendations regarding testing, based on any Delphi consensus we achieve. To assist with the conceptual work that must be done, I developed and circulated two items, a list of existing CT tests and a CT-Testing Bibliography (Apr. 19, 1988).

If you want copies of any of materials mentioned or if you wish to have a copy of the mailing/membership list, just drop me a line.

Last week I presented a workshop on testing CT at Sacramento State. At that time Perry Weddle agreed to publish the CT-testing bibliography and the list of CT tests in a fall issue of *CT News*. So, please get any corrections, additions, or deletions to me as soon as you can. AND NOW ON TO ROUND THREE!

The California State University

**** ROUND THREE ****

QUESTION: WHAT OPERATIONS ARE CENTRAL TO CT?

Response requested by June 25.

The sole task for Round 3 is for each of us to come up with that list of operations [or performances, behaviors, processes, outcomes or skills] which we understand to be at the core of the concept of Critical Thinking.

Although many of us have published on this question, since there are potentially sixty in our group and since I have no assistants, *it will be most helpful to me if you would take the time to distill your views and send a list of what you interpret the central CT operations to be, fell free to indicate which are the more general and which are the sub-operations.* Naturally you are welcome to include justifications for the items on your list.

In thinking about this, please keep in mind that in the two preliminary Delphi rounds we have narrowed our focus *for now* to CT "operations" understood as performances, behaviors, processes, outcomes or skills which could be tested validly and reliably at the college freshman/sophomore level. But keep in mind that we very likely will extend the question downward to K-12 later.

In Round 4, which I will initiate in Sept., you will be given combined lists and invited to comment on the wisdom of excluding, retaining, or amending the descriptions of specific items. If the results of Round 3 are clean enough, Round 4 will also invite you to begin rating items in terms of how more or less important, crucial, central, integral etc. they are to the concept of CT.

If you do not intend to respond to Round 3, for whatever reasons, please drop me a line so that I can keep track of participation levels.

Matt Lipman suggested that we might have an excellent chance of working with the APA and the Assn. for Informal Logic and CT to secure the use of the Wingspread Conference Center. *Please let me know if you think it would be productive to get together in that setting.* How might a conference be organized to most effectively use our valuable time? What kinds of issues, problems, tasks might we address? What kinds of solutions or desirable results might we achieve by meeting which couldn't be achieved (at all or as well) using the Delphi?

Since Round 3 asks the "big" question, please take the time to respond.

Sincerely,

Pete Facione

SUMMARY OF RESPONSES TO ROUND TWO
Overall response rate: 23 of a possible 51.

Question 1 of Round 2 asked if our sub-committee was sufficiently well constituted to move on with our task. As you can infer, the consensus answer was "Yes." A small number of additional names from psychology and education were recommended and strong cases for adding them were made. That is how we moved up to sixty members -- presuming the new nominees agree to join in. I'll send you an updated list soon.

Question 2 of Round 2 asked if we agreed with this claim:

"(1) Even if CT cannot be reduced entirely to an equivalent set of operations [or performances, behaviors, processes, outcomes, or skills,] (2) it is possible to conceptually analyze CT so as to describe a set of relevant and important CT operations, such that (3) using these descriptions, [competent] investigators could, on a consistent basis, gather sufficient evidence to draw conclusions, with high degrees of confidence, regarding the relative CT abilities of a group of people, [everything else being equal, of course]."

There was sufficient consensus on this to move ahead. The majority of responses (18 were strongly to moderately positive, 2 were negative and 3 did not respond to this question.)

However, to avoid misunderstanding, let us keep in mind that the above statement should *not* be interpreted to imply that construct validity can be determined strictly in an *a priori* manner (by simply coming up with our list). Nor should the words "relevant and important" be interpreted to imply that we can come up with an *exhaustive* list. Nor should the purpose in (3) be interpreted to mean that we have set our sights on actually writing a CT test, or, for that matter come to any agreement about what recommendations regarding testing we are likely to make.

Most of the positive responses (13 of 18) were very short, "Yes," or "Agree," or "Yes, this is an acceptable working hypothesis." Here are two of the longer positive responses I found interesting:

"I agree with the statement offered. I am compelled to note that the tasks described in the statement are going to be quite difficult to complete. There will not be universal acceptance. There will be criticisms (legitimate and illegitimate) of the results for a long time to come and many will run a course similar to criticisms of attempts to define and measure intelligence."

"(1) Yes, even though etc. -- though I believe we can achieve a broadly satisfying reduction... (2) agreed here, (3) agreed here. Therefore, yes. And rather than get hung up on this question, I'd prefer to jump right in and see whether we can do it. If we can, terrific! If we can't, well, then the doubting T's will have a field day; but I'm prepared to take that risk..."

One of the negative responses was expressed this way: "I'm sorry, but I can't help but get hung up on 'operations' -- the term so psychologizes and jargonizes... the question. Why not go for 'principles'?..."

The strongest negative was registered by a person who said, "I fear this

proposal to define CT operationally may have the effect of ruling out, by definition, one major position on CT, a position with which many in the CT field may be in sympathy, at least to some degree." This person was concerned that defining CT as a list of skills would focused on weak-sense-CT and missed strong-sense-CT which relates to a person's character -- "being self-critical, seeking to overcome blind spots, biases, prejudices..., [being] critics of one's society,... [seeking] what is of value in another's position..." The person asked, "Can these character traits be defined operationally?"

In contrast, note this response: "Yes, [I agree with the statement] particularly if we confine ourselves to abilities and ignore dispositions..."

Even though agreeing that "A subset of the processes that constitute CT can be assessed using the multiple-choice format that I assume is being sought," one person expressed serious concern saying, "I fear the creation of an instrument promising more than it can deliver -- an instrument touted not for what it is, an assessment device measuring certain important, but rudimentary, CT activities, but rather as a valid and reliable assessment tool for CT." He maintained that "As is so commonly true when discussing assessment, the instrument and its characteristics would then dominate the social construction of what is being assessed, in this case CT. The initiation of CT activities, generation of appropriate CT strategies, and defense of a tentative reasoned judgment are not susceptible to the type of assessment legislators are willing to finance or faculty are willing to undertake. The extensive writing or oral argument required to demonstrate CT, as I understand it, are not practical inclusions in an assessment instrument."

Four who agreed with the approach mentioned important factors which relate to construct validity. One mentioned the role of background knowledge in CT, another the role of divergent assumptions, another the relationship of CT skills to reading skills, and a fourth spoke to the need to validate any list of CT operations we might agree. There is much in the research literature about these problems. Steve Norris, in particular, has been working on strategies to respond to precisely these kinds of problems.

Although I mentioned all the negatives, the positive responses were far more numerous than the negatives. A consensus to move ahead exists. But we must not forget the warnings and concerns of our colleagues. <u>A great deal depends on what we come up with when we actually sit down to answer the question for Round 3,</u> since both the positives and the negatives were based on our ideas about what CT is.

<u>Rou 2 question 3</u> asked if people would be willing to agree my proposal that to get started by giving priority to the college freshman/sophomore level.

The responses ran: 14-yes, 3-no, 2-both, 3-abstain, and one that I could not figure out. Since the question was about *priority* and was not intended to exclude working at the K-12 level, which is, after all, what the APA Pre-college Committee is charged with doing, I believe we have sufficient consensus to focus initially on the lower division post-secondary level.

Here are some "Yes, give priority to the frosh/soph level" comments:
"Most if not all of the CT we teach is directed at this level"
"I doubt philosophers should take the lead...when it comes to K-12."
"I'm still unpersuaded to reverse my formerly expressed views --

intro. undergraduate level first, until we get square there, where we live."

"I feel rather strongly that we should begin on the post-secondary level. I agree with those who say that that is where the strength of our membership lies and that that is where the vast majority of our members teach."

"Yes. That's where most of the pedagogical action is; that's where the students we're interested in testing and have relatively easy access to are to be found. Later, if we succeed at all here, we can extrapolate to other levels."

"I agree in the light of what was said in Round 1."

"Why not? It's what we know best, and we can always move on to other levels later."

On the negative side:

"[Your] recommendation seems arbitrary and not consistent with the fact that this is a pre-college committee."

"No, based on the name of the committee."

"I would prefer to begin at the K-3 level. My position and opposition is based upon pedagogical and theoretical concerns which I assign a higher priority to than to political concerns related to the officers and membership of the APA.... I am willing to accept that the sub-committee begin with the college level but the project will have to be extended downward then..."

Two people expressed the concern that this was a difficult question to answer until one knew the purposes for testing. [A point well taken.]

Another suggested that our goal should be to make "contributions to the criteria for a college test...[but that] individuals should be encouraged to make up their own [assessment instruments] and try them out, obtain correlations with other tests and with outcomes, and then subsequently compare notes with one another as to what worked and what didn't."

Thanks to all who responded to Round 2. Your letters were most interesting and thoughtful. Don't forget -- Round 3 by June 25!

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Department of Philosophy
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May 18, 1988

Dear Colleagues,

I hope this letter finds you well, happy and looking forward to a restful as well as productive summer. In my last letter I mentioned that I would be attending the "First National Conference on Assessing Thinking" in Baltimore and that I would be sending along a report. The conference was very rewarding and the promised report is attached.

I've also attached the current list of persons invited to respond to Round 3 in our Delphi process. We will have to freeze the list at this point. According to what I've read about the Delphi method, once the central debate is joined, it can be disruptive to try to add people who have not the benefit of earlier rounds in the dialogue. With the circulation of the Round 3 question we have reached that point.

Many thanks to those who have already sent there responses to Round 3. Don't panic if you haven't yet, though. The target date is June 25.

Have a good summer. I look forward to hearing from you.

Sincerely,

Pete Facione

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June 28, 1988

Dear Colleagues,

Thanks for the large number of interesting responses to the Round 3 of our critical thinking Delphi process. Judging from the length and sophistication of what many of you sent, it should take me a fair amount of time to organize and synthesize the material and then to frame fruitful questions for our next round.

I expect to be working on this for several weeks, so if for some reason you haven't had the opportunity to respond to Round 3, please know that your ideas are more than welcome.

Have a good summer and thanks again for so much high quality participation -- it's very encouraging.

Sincerely,

Pete Facione

The California State University

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Fullerton, California 92634

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(714) 773-3611

Sept. 1, 1988

Dear Delphi Colleagues,

I'm working through the 25 responses to Round 3, which asked for your list of core CT skills. The scope, quality and care evident in your responses is most impressive. Right now I'm analyzing, synthesizing, and organizing the ideas so that I can play them back for your reaction and rectification. Expect the Round 4 letter in about two weeks.

A Delphi operational rule I've adopted is to drop persons off the Delphi mailing list if they have made no contact whatsoever after receiving invitations to respond to at least three Delphi rounds. It's fair to say a person's sustained silence signals he or she wishes not to be included.

Included here is something Phil Pecorino shared. It lists (a) Critical Reasoning and Informal Logic Texts, (b) Related Texts, (c) Logic Texts, (d) Newsletters and Journals related to CT, and (e) CT Centers and Organizations. Also, you might also want to write to James Bell, Howard Community College, Columbia, Maryland, 21044 and ask for a copy of his 132 page _Guide to CT for Maryland Social Scientists_. It includes a wealth of material on how CT is seen from different disciplinary backgrounds and it lists a number of ideas and resources.

Thanks again for so much high quality participation in Round 3 -- it's very encouraging. You'll be hearing from me soon.

Sincerely,

Pete Facione

The California State University

California State University, Fullerton
Fullerton, California 92634

Department of Philosophy

Sept. 23, 1988

ROUND 4

Dear Delphi Colleagues,

Round 4 seeks verification of a list of CT skills and sub-skills. Please accept, reject, amend, and comment on the group's responses to round 3. Remember, the goal in this phase of our project is to arrive at an accord regarding the skills we understand to be central to CT.

Your responses to round 3 yielded 200+ pages. Some sent previous publications, some sent lists and commentaries, some wrote new pieces of clearly publishable quality. You tended to approach the question of identifying core CT skills and sub-skills four ways: (a) by appeal to your own experience and understanding, (b) by citation and comment on what other CT authorities (including others in our Delphi list) have written or said, (c) by describing the key characteristics of persons who have internalize CT, and (d) by consideration of what should reasonably be taught or included in a CT curriculum. In addition to differences of opinion, there were variations in disciplinary orientation, vocabulary, and emphasis. There were also differences in the specificity, depth, and scope of responses. Some were extremely general, others very specific.

Distilling your opinions, positions, views, ideas, lists, descriptions, explanations, examples, counter-examples, caveats, credos, and course outlines was one of the most intellectually interesting and stimulating experiences I've ever had the pleasure of attempting. Although I've been teaching and researching CT for two decades, I noticed that my own views on the range and character of CT expanded greatly as a result what you contributed in round 3.

In naming and describing CT skills for Round 4, I intend to rely on standard English usage and to avoid technical or discipline-specific vocabulary. Your responses emphasized generic skills. Distilling your responses, I name and describe six generic CT skills and give two or three sub-skills under each. Clearly additions or deletions might be needed. To avoid prejudicing your responses at this crucial time, I do not indicate the numbers of persons who may have agreed on any given point. Areas of agreement and controversy will come out in round 4. In this round you are invited to make a number of kinds of responses to a variety of questions. However, because organizing the material and framing the issues was such a delicate and complex task, I urge you to read the whole package and get an overview of the terrain prior to starting to reply.

Thanks again for the high quality responses to Round 3. To insure we are talking about the same things when we refer to CT skills, we'll need maximal participation in round 4. If you could consider this material and reply in 15-20 working days that would be wonderful. If you need more time, or want to discuss any aspect of this project, call me at CSUF (714) 773-3742, [office] or 372-3611 [dept.], or 993-1356 [home].

Sincerely,

There are five parts to Round 4:

(1) The listing of CT skills and sub-skills.
(2) A model diagramming the flow of CT skill input and output.
(3) A list of things some of you said CT is not.
(4) A description of what is meant by "skill".
(5) A list of caveats and comments you shared.

Round 4: Part 1, CT skills

Comment: We've all seen examples, like the duck-rabbit, of how comprehension combines imposing an order on reality as well as discovering an order inherent in reality. Applying that lesson to the problem at hand, there are many ways CT skills and sub-skills could be organized. Even among those of you who essentially agree, the variations in your responses to round 3 illustrate this. After considering a large number of ways of organizing things, I've decided on the configuration you will find below. True, the skills and sub-skills could have been named using other labels or grouped in other ways. To this add that some sub-skills may come into play in more than one general area, some can operate on the products of others, some presuppose others, some are almost always employed while others may not come into play except under special circumstances, and you have an even more conceptually complex situation. Now add that some of us might exclude one of the more generic groupings, to say nothing of how we might want to add, subtract, amend or rearrange the sub-skills, and the complexity of our task takes on greater magnitude. There were other ways to "see" the Round 3 data. So, beside asking yourself if each skill and sub-skill belongs in the list, and if anything central is missing, another question to ask is, like the duck-rabbit, can you see CT this way?

Instructions: *Below you will find a list naming and describing six core CT skills and sub-skills. Read and consider the entire list. Then,*

(1) Considering each *skill* and *sub-skill*, mark each "Yes" if you verify it to be a core CT skill or sub-skill and "No" if you would argue to exclude it. State your reason for excluding any marked "No".

(2) Make needed substantive amendments to the *descriptions* of any *sub-skill*, and explain why the change is needed. Add any missing *sub-skill*, name and describe it, locate it within one of the six CT skills. Considering the *sub-skills* within each of the six CT skills, indicate which sub-skills, if any, should be moved to some other skill.

(3) Amend the list of six CT *skills*. If you delete a skill, indicate what to do with its sub-skills. If you add a missing CT skill, name and describe it, name and describe its sub-skills, explain how it is central to CT, how it differs from any of the six skills on the current list, and why it merits being listed at the level of a skill rather than a sub-skill.

(4) Consider the NOTE regarding the role and composition of a human's *knowledge base*, verify, amend, comment on any aspect of this.

(5) Make any needed editorial changes.

(6) Comment, if you wish, on the entire list of skills, its organization, utility, what have you.

I urge you to read the entire list of skills and sub-skills before beginning to respond to any specific item. Thanks!

PROPOSED: Core Critical Thinking Skills

TAXONOMY

1. Interpreting -- Observing, Decoding, Clarifying.
2. Inferring -- Querying, Conjecturing, Drawing Conclusions.
3. Analyzing -- Locating Arguments, Parsing Arguments.
4. Evaluating -- Verifying Claims, Assessing Logical Strength.
5. Expressing -- Stating Results, Describing Procedures.
6. Monitoring -- Regulating, Reviewing, Correcting.

DESCRIPTIONS OF SKILLS AND SUB-SKILLS

YES/NO

1. INTERPRETING: *To comprehend the significance of* a wide variety of experiences, situations, judgments, beliefs, rules, procedures and criteria.

1.1 OBSERVING: To detect, attend and correctly perceive experiential input with particular focus on input that conveys or is intended to convey data, information, or inferential relationships.

1.2 DECODING: To detect, attend to and correctly perceive the informational content, rules, procedures, criteria, and inferential relationships expressed in various convention-based communication systems, such as language, social behaviors, drawings, numbers, signs and symbols.

1.3 CLARIFYING: To make explicit, through stipulation or description, the contextual, conventional and/or intended meanings of words, ideas, concepts, statements, behaviors, drawings, numbers, signs or symbols; to remove confusing vagueness and ambiguity; to facilitate communication.

2: INFERRING: *To secure elements needed to make inferences and to determine the inferential relationships between or flowing from* statements, descriptions or representations.

2.1 QUERYING: At any point in the CT process, to recognize the need for evidence or information of some kind, and to formulate and execute a strategy for seeking and gathering that evidence or information.

2.2 CONJECTURING: To formulate alternatives, to develop hypotheses, to postulate suppositions.

2.3 DRAWING CONCLUSIONS: Given a set of statements, descriptions or representations, to educe their inferential relationships and to educe the consequences which they support, warrant, imply or entail.

* * *

NOTE: As many of you argued, all CT skills, but particularly sub-skills like 2.1, 2.2 and 2.3 presume a knowledge-base. A human's knowledge-base is composed of at least these things:

(a) a world view which includes one's understandings of
  * what is real (a metaphysics),
  * how knowledge is gained and refined (an epistemology),
  * what is important or valuable (a value theory);

(b) a data base, including one's opinions, beliefs, experiences, etc. as filtered through the world view;

(c) an inference engine which includes
  * general rules for drawing logical inferences (a logic),
  * sets of procedures and criteria appropriate for making reasonable judgments within specific areas of human thought and inquiry (discipline-specific rules.)

Executing sub-skills 2.1, 2.2, and 2.3 as well as 4.1 and 4.2, more effectively can be achieved by learning how to think logically, by expanding one's repertoire of sets of procedures and criteria used in different areas of human thought and inquiry, and increasing one's base of relevant data.

An implication of this analysis of CT skills and sub-skills is that they transcend specific disciplines, but executing them demands background knowledge, some of which is specific to how one goes about making reasonable judgments in different realms.

Becoming adept at CT involves learning CT skills and learning to use those CT skills more effectively in different contexts -- hence the importance of a liberal education to go along with one's CT ability.

* * *

3. ANALYZING: *To identify the inferential relationships between* statements, descriptions or representations which express experiences, situations, judgments, beliefs, or opinions.

3.1 LOCATING ARGUMENTS: Given a set of statements, descriptions or representations, to determine whether it does express or was intended to express a reason or reasons in support of some claim, opinion or point of view.

3.2 PARSING ARGUMENTS: Given a the expression of a reason or reasons in support of some claim, opinion or point of view, to identify: (a) the intended conclusion, (b) the premises and reasons advanced in support of that conclusion, (c) additional unexpressed elements of that reasoning, such as intermediary conclusions, unstated assumptions, and (d) for exclusion, any items contained in body of expressions being parsed which are not intend to be taken as crucial to the reasoning being expressed.

4. EVALUATING: *To assess the credibility of* statements, descriptions or representations; *and to assess the strength of the expressed inferential*

relationships between such statements, descriptions or representations.

4.1 VERIFYING CLAIMS: To assess the degree of confidence to place in a given statement, description or representation.

4.2 ASSESSING LOGICAL STRENGTH: To determine the nature and quality of expressed inferential relationships; to judge whether the assumed truth of the premises of a given argument justify one's accepting as true, or very probably true, the expressed conclusion of that argument.

5: EXPRESSING: *To state, describe or represent to one's self or others the results of one's CT activities and the way one went about producing those results.*

5.1 STATING RESULTS: To produce accurate statements, descriptions or representations of the results of one's CT activities so as to analyze, evaluate, infer from, monitor or remember those results, or so as to communicate them effectively to others.

5.2 DESCRIBING PROCEDURES: To produce accurate statements, descriptions or representations of how one applied and executed any CT skill or sub-skill so as to evaluate or monitor one's proficiency, or so as to communicate to others about how one went performing a given CT skill or sub-skill.

6: MONITORING: *To regulate all aspects of one's own CT activities, the elements used in those activities, and the results produced by those activities,* particularly by applying the skills of analyzing, and evaluating to one's own inferring with a view toward confirming, validating and/or correcting the results.

6.1 REGULATING: To sequence one's execution of CT skills and sub-skills.

6.2 REVIEWING: To examine one's own CT activities and verify both the results produced and the correct application and execution of each CT skill and sub-skill involved.

6.3 CORRECTING: Where errors are found in one's own CT activities, to correct those errors and remedy their causes.

Round 4: Part 2. An Input/Output Model of CT Skills

Comment: There's no denying that the model I've come up is heavily influenced, for good or ill, by my research in computer science and artificial intelligence. The arrows indicate the direction of the flow of input and output as it circulates between and is operated upon by the six CT skills, here conceived of as functions.

In this model, expressing receives output in the form of information from the knowledge base, the results of other CT functions, and lists of the steps performed during other CT functions. Expressing then formats that output for use by the next CT function, for storage in the knowledge-base, or for transmission out of the CT cycle.

Within the CT cycle, monitoring receives material from expressing and, as the regulating and self-correcting function, determines where it should go next. It can route things into or out of any of the five other CT skills or the knowledge-base. For example, monitoring can loop material back through any skill. Thus, it can send the results of one's own inferring for review by routing them to evaluating before allowing expressing to transmit them to others. Or, it can route information from the knowledge base to evaluating to help it verify a claim, or to inferring to help it draw a conclusion using criteria specific to a given discipline.

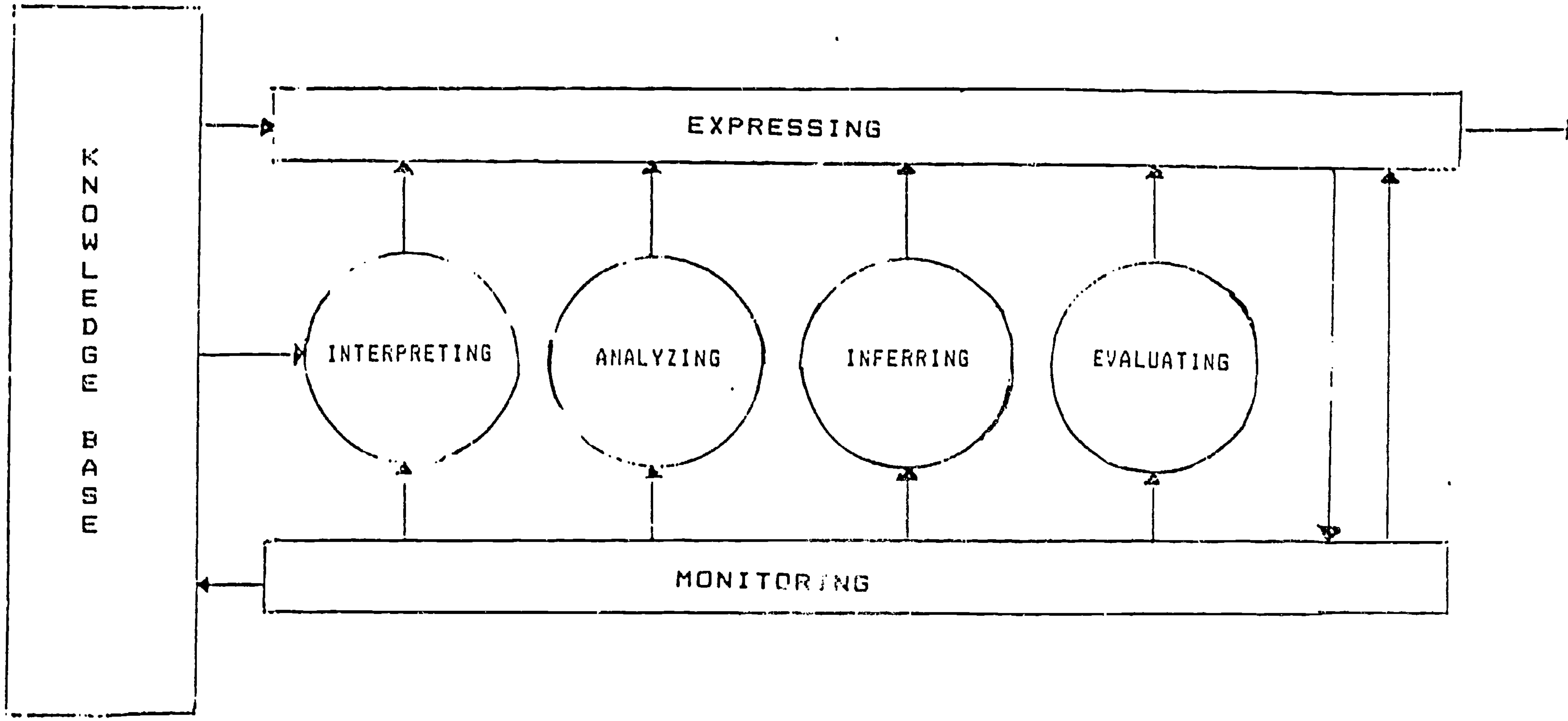
The four CT skills many of us spend so much time helping students become proficient at, namely interpreting, analyzing, evaluating, and inferring receive material routed to them by the monitoring function. They operate on this material. And then they send the results to the expressing function to be formatted for delivery elsewhere. These skills also output a record of the steps they performed in coming to those results. This record is crucial if the monitoring function is to work correctly, since it must check not only what was achieved but how it was achieved.

The knowledge base is a storehouse from which interpreting, analyzing, evaluating and inferring draw resources. It stores the output of any CT function, when directed to do so by the monitoring function. The knowledge base also filters raw external input and, thus, influences the interpreting of what we are observing, decoding or clarifying.

Instructions: Consider the model on the next page.

1. Does it make sense to you?
2. Is it accurate?
3. Is it useful?.
4. Since many people find pictorial models helpful in understanding complex relationships, can you suggest how this one might be improved or, if you recommend discarding it, can you propose an alternative?

AN INPUT/OUTPUT FLOW MODEL OF CRITICAL THINKING SKILLS



Round 4: Part 3, What CT is Not

Comment: Many of you distinguished CT skills from other closely related things. Below is a list of what various persons said was not CT. Just because something is on this list does not mean a person does not use CT in doing the thing nor that a person might not do the thing before, after or during CT.

Instructions: Please consider this list, verify it, amend it, and comment on its utility.

CRITICAL THINKING IS NOT

YES/NO

1. Sensing, (Seeing, Touching, Hearing, etc.)
2. Reading, Listening,
3. Speaking or writing,
4. Motivating, persuading, selling,
5. Interrogating, cross-examining, petitioning,
6. Physically investigating the world around,
7. Trouble-shooting, problem-solving, puzzle solving,
8. Decision-making, selecting, choosing, exercising one's will,
9. Planning, defining goals and objectives,
10. Finding or ascribing a meaning to art, life, or events,
11. Defending an opinion or belief, arguing a case,
12. Managing, administrating, or governing persons or things,
13. Philosophizing,
14. Conducting research within any particular discipline,
15. Experiencing, feeling, emoting, or empathizing,
16. Communicating using language.

Round 4: Part 4. The Concept of a Skill

Comment: It became clear from your responses that it would be useful to have an understanding about what a skill is. Although there may be very little disagreement about this, some of you mentioned subtleties others may or may not accept. Based on your contributions I've written a little narrative.

Instructions: Revise, edit and complete the following narrative:

A skill is the ability to do something well. Having a skill includes knowing what to do, when to do it, and how to do it. That is, being skilled at something involves knowing a set of procedures, judging when to apply those procedures, and being proficient or adept at executing those procedures. Skills can l aught in a variety of ways including, but not limited to, coaching, demonstrating, and training. Part of the teaching involves making the procedures explicit and showing when and how they are employed. Skills can be learned through a combination of observation, guided practice, drill, and self-correction. Persons can be judged as being more or less proficient in a given skill. The first way of assessing is to observe the skill as it is being performed. A second way is to compare the outcomes (if any) that result from executing a given skill against some set of criteria. A third way is to query persons and receive their descriptions of the procedures and judgments they are using as they perform that skill, would use if they were to perform that skill, or did use when they performed that skill. Since we cannot directly observe the performance of mental skills the way we can physical skills, only the second and third ways are available to those who would assess CT. The second way is (is not) superior to the third because..........., provided that...........

Round 4: Part 5, Caveats and Cautions

Comment A number of you sent comments. Some were intended as caveats or cautions, other as encouragement. I appreciate them all. I thought some might be good to share. In many cases to save space I have paraphrased. You might agree or disagree with what your colleagues have said. Or, reading this list might prompt you to pass along a contrary view. Let's find out.

Instructions Consider these comments. Make any remarks you wish, whether in agreement or disagreement. Use these remarks as spring boards for your own reflections.

AGREE/DISAGREE

1. Keep in mind that our goal in defining CT is to do some assessment. But you don't just start testing people. Assessment needs focus and purpose.

2. I agree with working at the college level only because I want to have an idea about what we should be doing with kids in K-12. I think we can use what we say about CT for college frosh/soph to guide curriculum development in K-1. CT. Of course, we will have to adjust reading levels, background knowledge expectations, and lots of other things.

3. Skills are not the same as operations. Resist behaviorism! Behaviors give evidence that a person has a skill or ability, but a skill is not a set of behaviors.

4. Don't trap yourself into using the jargon or vocabulary of any one discipline (especially philosophy) when you describe CT.

5. Although no word will escape criticism, don't use "deduction" or "induction." Avoid semantic spats.

6. If CT is a set of attitudes as well as a set of skills that poses no problem for assessment because we can just develop ways to assess the CT attitudes, too.

7. CT is thinking skills. Saying CT is a set of attitudes may be a way of describing what people who are good at CT are like, but it is not a way of describing critical th king itself.

8. Even if we agree on what CT is, we still have to face the problem that any student might get the right answer on a CT test but for the wrong reason, or might get a problem wrong but have done a good job of CT.

9. When assessing CT we should not duplicate efforts with areas already well tested by existing instruments, such as covered by reading or intelligence tests.

10. You don't have to test every ingle CT sub-skill to decide that a person is good at CT.

11. I looked at that list of experts and you have all the big names I can think of, but you can't possibly expect those people to agree. If they did agree, even on what CT is, that would really be something. Good luck!

FEEL FREE TO DISCUSS THIS MATERIAL WITH COLLEAGUES, IF YOU WISH.

PLEASE DON'T REPRESENT ANY OF THIS LETTER AS THE OPINION OF OUR DELPHI GROUP.

The End ** Thanks!

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Nov. 22, 1988

Dear Delphi Colleagues,

During this Thanksgiving season and I want to express my gratitude to you for your generous participation in this research during 1988. The many responses to the very long and difficult ROUND 4 have been most gratifying. There won't be any more "ugly-long" rounds like that, I promise.

Let me pass along this quick review of what we accomplished in 1988. First, working under the auspices of the American Philosophical Association Committee on Pre-College Instruction in Philosophy, we built the Delphi list of experts. By your recommendations, during Rounds 1 and 2 (Feb. 11 & Mar. 14) we expanded the original APA list of about ten names to a working group which numbers around 45 active participants and which, I am proud to say, includes many of the most important people in CT research today.

During Round 1 and 2 we agreed that whatever CT is, we would be possible for us to make the concept operational to the extent that important parts of CT could be assessed validly and reliably. We also agreed to begin by identifying the core elements of CT expected at the Frosh/Soph. general education college level. We agreed to use this college level theoretical-construct of CT to guide what is said about CT the K-12 levels. Round 4 (Sept. 23) sought to verify the concept of CT which emerged from Round 3 (May 4). A quick look at the results of Round 4 is most encouraging!

Along the way we shared journal articles, lists of existing CT tests, CT bibliographies and other items of mutual interest. The Delphi, however is not a substitute for the fine work being done by journals, newsletters and the many centers for CT that have emerged in recently.

While I work on analyzing the results of Round 4, I invite you to consider where do we go from here. Last spring I outlined a four phase Delphi project. When we achieve consensus on the core list of CT skills expected at the lower division college level, we will have completed the two of the four phases. Originally phases 3 and 4 were described this way:

Phase 3: Recommendations

The goal of this phase is to communicate our findings about what CT is and whether there is an adequate way of characterizing CT operationally so as to permit its being tested at some educational level. Depending on our results in Phase 2, we will recommend either that programs aimed at testing CT be abandoned, or that they be focused in certain ways. If this is the direction Phase 3 takes, then we will also try to come to consensus on recommendations regarding the relative importance of different kinds of CT sub-skills and possible strategies for accessing and measuring those sub-skills.

Phase 4: Design and Validation of Model Testing Strategies

Contingent on the results of earlier phases, the goal, if it were considered achievable in principle, would be to construct and evaluate different approaches to testing CT at some appropriate educational level or levels. We might find ourselves breaking into sub-committees to achieve this goal, although all work will

have to be guided by the agreements reached in earlier phases and as well as by the special expertise of those who understand the intricacies of designing, piloting, norming and validating educational tests at specific educational levels.

To date I've done little regarding preparing to communicate our findings. Two CT newsletters interested in publishing something regarding our results have contacted me. Also, the Pre-College Committee scheduled a session at the March 1989 APA meetings at UC Berkeley. At that session I'll be outlining our Delphi process and what we have agreed on by that time. More suggestions are most welcome.

For many reasons I am extremely skeptical about actually developing a good CT test using a Delphi process. Once we declare consensus regarding the theoretical construct of CT for the general education (lower division) college level our choices include at least these three, and maybe more.

(1) We could move on to consider questions like these: Given what we understand CT to be at the college level, what does CT mean at different grade levels in K-12? What is the relative importance of the skills or sub-skills in our college-level CT construct in terms of testing, say junior high school students? How might one write a question which assesses a given sub-skill in, say 5th graders?

(2) Having declared consensus on a conceptualization of CT for use at the college level, we might recommend that test makers at all educational levels be guided by our conceptualization. But we, ourselves, might decide to leave the matter of writing specific tests for specific age groups to others, better qualified than ourselves for developing and validating such instruments. Those of us interested in specific grade levels could be put in contact with one another.

(3) When we reach consensus on the CT concept as it applies at the college level, we might recommend examples of how questions framed to address these skills and sub-skills in college students or K-12 students. We could share these example questions and evaluate them. Those which we think *a priori* might be good to assess certain skills or sub-skills, could be included in recommendations we make regarding CT assessment. These questions would not be a CT assessment tool. At best we might think of them as models of how to conceive of questions that might be included in a CT assessment.

Note: Even with questions which *a priori* seem to address the proper concept of CT and avoid other difficulties (like relying on special background knowledge or esoteric vocabulary), there is still the problem of *a posteriori* verification. Steve Norris has done important work on how to overcome the "construct-validation" problem, namely determining, for any given test item, if students get right answers because of good CT skills and wrong answers because of inferior CT skills.

Give the issues of what do to next some thought. I would welcome hearing from you on this. Have a joyous holiday season and thanks again for contributing so generously during phases 1 and 2 of this project.

Sincerely,

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Department of Philosophy
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Feb. 7, 1989

Dear Heroic Delphi Colleagues,

34 people responded to Round 4. A great return, our biggest so far -- both in numbers of persons and in numbers of pages! I will tally, analyze, distill and share what people said on each chunk of Round 4. That way you will have the benefit of an overview of what others in the Delphi are thinking. But, intending to spare all of us any more horrendously burdensome rounds, when it comes to formulating the next set of questions, I'll keep them as short and focused as possible.

I particularly want to thank the many people who sent me detailed, thoughtful, (and even footnoted) responses. Several ran near ten pages single spaced. Not intending to diminish the value of the brief "Yes/No" responses as we approach consensus on crucial points, I must acknowledge and convey my appreciation for the many extra hours of work several of you are putting in. Also, I've learned a great deal from your sensitive and sensible comments.

Yes, we are approaching consensus. My first two readings of the input on Round 4 is that we have a great deal of accord on the list of CT skills, although there will be scores of adjustments and amendments to be made. Also, your comments on what a skill is and how a cognitive skill can be assessed suggest we are close there too. But I'll be summarizing all that and more for you very soon.

In the next few weeks I'll be sending you a few quick short rounds. My plan is to focus each brief letter on one discrete aspect of our work. We should try to complete several mini-rounds this spring. That way I'll be able to rough out a first draft of our report to the APA Pre-College Philosophy Committee during the summer. Be thinking about recommendations.

I've enclosed a list of the people who are participating in our Delphi research project. The "R1" "R2" "R3" and "R4" symbols indicate the rounds to which the person has contributed. The "!" symbol means the person communicated an interest to be involved, but has not responded yet to any rounds. Currently there are 56 names on the list of people being invited to respond. A few have never responded in any way. So, when it comes to making our final report, I expect there to be around 50 of us in the group.

I'll be in touch with a summary of Round 4 and some mini-rounds 5, 6 etc. very soon. Thanks again for all your work.

Sincerely,

Peter A. Facione

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DELPHI ROUND 5-A

Feb. 28, 1989

Dear Delphi Colleagues,

One of you wrote, "I'm beginning to think that to have done all that [we have done] and not have tried to define CT may turn out to be a mistake."

Also in response to ROUND 4 three or four of you commented like this: "I have no major quarrel with any parts of your organization, [but] your emphasis leaves out a major component of CT -- the dispositional component and the set of values inherent in being a critical thinker... I think it is a good working model of CT skills, but an incomplete picture of being a critical thinker."

In view of the many positive responses to ROUND 4, yet sensitive to the concerns raised by comments like the above, ROUND 5 begins by building on our success in articulating a decent first draft list of CT skills. In this letter we start right in on the question: *For purposes of ner ral education assessment at the college lower division level, what do we experts recommend be included as a core critical thinking skill?*

In addition to asking your endorsement of a revised draft of the skills dimension of CT, this letter also shares some key ROUND 4 results and some of the many useful comments you sent.

The next letter, ROUND 5-B, works on the two other aspects of CT you commented on in your ROUND 4 responses -- namely CT's dispositional and the normative dimensions. Some of this also finds its way into the revised skills statement -- see 6.1! ROUND 5-C picks up the remaining pieces of ROUND 4 and asks your approval of an outline of our report to the APA Committee on Pre-College Philosophy.

The table at the end of this letter shows that over 85% of us, (23 of 26), could be described as fundamentally in accord with our first listing of CT skills. The second draft you are now being asked to consider endorsing was prepared in view of the many helpful comments and suggestions you sent in. I am very optimistic about the revised statement of CT skills, first because ROUND 4's draft was approved by such a solid plurality, and second because your suggestions helped me substantially strengthen and enrich that statement.

Since we are very close on so many things, your approval or disapproval of the expressions of our views presented in ROUND 5 should clarify things enough for me to start putting together our report to the APA Committee on Pre-College Philosophy. Where we have consensus our report will say so. Where we diverge, it will say that as well.

I truly appreciate all that you have already contributed, and I realize you you are all very busy folks. Yet I beg your continued indulgence. Please respond to the three round 5 letters with all reasonable dispatch. All responses are welcome, no matter how brief or selective.

With sincerest gratitude,

Half of this letter shares comments regarding defining and testing CT made in response to ROUND 4. Before digging into our revised statement of CT skills, you might jump to page 6 and look through the comments or examine the tabular results of our earlier work on page 10. I learned, for example, that not listed in our original statement was a skill the majority feels is part of CT -- arguing. And, given what this Delphi project is all about, how on earth could I have omitted the CT skill of analyzing an idea from the first draft?

<u>ROUND 5-A, PART 1 -- CT SKILLS</u>

INSTRUCTIONS: Consider the following amended description of CT skills along with the accompanying statements. Starting with the title and preamble, make any needed changes, deletions, or additions (editorial or substantive). After working through the descriptions and statements you will be asked specific questions regarding endorsement. Please respond to those question as well.

<u>Skills Dimensions of Critical Thinking</u>

For purposes of general education assessment at the college, lower division level, we understand CT to include the cognitive skills of interpreting, inferring, analyzing, evaluating, expressing and monitoring. Because of our collective conviction regarding their centrality to CT, we urge those persons interested in assessing the skills dimensions of CT focus on these six abilities. However, since CT can be subclassified in a number of legitimate ways, our subclassification should not be interpreted as an educational taxonomy nor as implying or presupposing any psychological, logical or epistemological order or sequence of skills. While including those skills we take to be central to CT, we do not claim that our list is exhaustive in either breath or detail.

Critical thinking involves actively interpreting one's experiences and self-consciously making and expressing one's analytical, evaluative and inferential judgments regarding what to believe or do. As such, critical thinking is a pervasive and multi-dimensional human phenomenon involving both dispositions and skills. Without diminishing the vital importance of cultivating CT dispositions throughout the K-12 and post-secondary educational process, we have here chosen to focus our attention on listing and describing CT abilities. As a goal statement of what a generally educated college level critical thinker should be able to do, we hope our consensus description of CT skills will assist in CT assessment and CT curriculum development both at the college and the K-12 levels.

Among the many ways one might improve one's CT are by reflecting on one's reasoning processes and learning how to think more analytically, objectively and logically, by expanding one's repertoire of those more specialized procedures and criteria used in different areas of human thought and inquiry, and by increasing one's base of information and experience. An implication of our analysis of CT skills, however, is that CT skills *per se* transcend specific disciplines, yet executing them successfully in certain contexts demands background knowledge, some of which may be specific to how one makes reasonable judgments in that context. Since becoming adept at CT involves learning to use CT skills effectively in many different contexts we cannot overemphasize the value of a solid liberal education to supplement the honing of one's CT skills and the cultivating of one's CT dispositions.

Names of Core CT Skills and Sub-skills

1. Interpreting - Categorizing, Investigating, Decoding, Clarifying.
2. Analyzing - Analyzing Ideas, Identifying Arguments, Analyzing Arguments.
3. Evaluating - Assessing Claims, Assessing Arguments.
4. Inferring - Querying, Conjecturing, Concluding, Developing Reasons.
5. Expressing - Stating Results, Describing Procedures, Stating Arguments.
6. Monitoring - Self-examination, Self-correction.

Descriptions of Core CT Skills and Sub-skills

1. INTERPRETING: To comprehend the meaning or explain the significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures and criteria.

1.1 CATEGORIZING: To formulate categories, distinctions, frameworks or questions, and to describe experiences, situations, beliefs, events, etc., so that they take on comprehensible significance or meaning, as for example to recognize a problem and define its character without prejudice to inquiry.

1.2 INVESTIGATING: To actively seek, attend to, discriminate and describe experiential input relevant to a given situation, problem or concern; to gather input that conveys or is intended to convey data, information, or inferential relationships, as for example to gather evidence relevant to solving a problem in the light of how that problem is defined.

1.3 DECODING: To actively detect, attend to and correctly understand, the informational content, affective purport, directive functions, intentions, purposes, symbolic significance, values, views, rules, procedures, criteria, or inferential relationships expressed by others in convention-based communication systems, such as in language, social behaviors, drawings, numbers, signs and symbols.

1.4 CLARIFYING: To explain, paraphrase or make explicit, through stipulation, description, analogy or figurative expression, the contextual, conventional or intended meanings of words, ideas, concepts, statements, behaviors, drawings, numbers, signs, symbols, rules, events or ceremonies; to an extent proportionate with the purposes at hand, to use stipulation, description, analogy or figurative expression to remove confusing, unintended vagueness and ambiguity, or to design a reasonable procedure for so doing.

2. ANALYZING: To identify the intended inferential relationships among statements, questions, concepts, descriptions or other forms of representation intended to express beliefs, judgments, experiences, information, opinions.

2.1 ANALYZING IDEAS: to identify expressions used in communication and determine the role they are intended to play in arguing or persuasion, as for example to identify a phrase intended to trigger a sympathetic emotional response and induce an audience to agree with an opinion; to identify related judgments, views, or concepts and to determine the conceptual similarities and differences between them; to identify issues or problems, determine their component parts, and identify the conceptual relationships of those parts to each other and to the whole.

2.2 IDENTIFYING ARGUMENTS: Given a set of statements, descriptions, questions or representations, to determine whether it does express or was intended to express a reason or reasons in support of or contesting some claim, opinion or point of view.

2.3 ANALYZING ARGUMENTS: Given the expression of a reason or reasons intended to support or contest some claim, opinion or point of view, to

identify: (a) the intended main conclusion, (b) the premises and reasons advanced in support of the main conclusion, (c) further premises and reasons advanced as backup or support for those premises and reasons intended as supporting the main conclusion, (d) additional unexpressed elements of that reasoning, such as intermediary conclusions, unstated assumptions or presuppositions, (e) the overall structure of the argument or intended chain of reasoning, and (f) any items contained in body of expressions being examined which are not intend to be taken as part of the reasoning being expressed or its intended background.

3. EVALUATING: To assess the credibility of statements, descriptions, questions or other representations expressing experiences, situations, beliefs, judgments, or opinions; and to assess the strength of the expressed inferential relationships among such statements, descriptions, questions or other forms of representation.

3.1 ASSESSING CLAIMS: To assess the degree of credibility to ascribe to a source of information or opinion; to assess the relevance of questions, information, principles, rules or procedures [illegible] ections to a given issue or concern; to assess the truth or the level o[illegible] idence to place in any given representation of an experience, situation, judgment, belief or opinion.

3.2 ASSESSING ARGUMENTS: To determine the nature and quality of expressed inferential relationships; to judge whether the assumed truth of the premises of a given argument justify one's accepting as true, or very probably true, the expressed conclusion of that argument; to anticipate and raise questions and objections, and then to assess whether these point to significant weakness in the argument being evaluated; to determine whether an argument relies on false or doubtful assumptions or presuppositions to judge how crucially these affect its strength; to judge between reasonable and fallacious inferences; to judge the probative strength of an argument's premises and assumptions with a view toward determining the acceptability of the argument; to determine and judge the probative strength an argument's intended and unintended implications with a view toward judging the acceptability of the argument; to judge the extent to which additional information would strengthen or weaken an argument.

4: INFERRING: To identify and secure elements needed to make inferences and to determine the inferential relationships between or flowing from statements, descriptions, questions, or other forms of representation on the basis of which inferences can be drawn.

4.1 QUERYING: to recognize the need for evidence or information of some kind, in particular to recognize which statements, including those offered as premises, need justification, and to formulate and execute a reasonable strategy for seeking and gathering that evidence or information.

4.2 CONJECTURING: Given a problem, question or point of view on an issue, to formulate multiple alternatives, develop hypotheses, or postulate suppositions, and to design reasonable strategies for determining their plausibility, viability or relative merit; to objectively draw out the presuppositions and the consequences of decisions, positions, beliefs or views with which one might agree or disagree.

4.3 CONCLUDING: Given a set of statements, descriptions, questions or other forms of representation, to educe with the proper level of logical strength, their inferential relationships, both deductive and inductive, to educe the consequences or the presuppositions which they support, warrant, imply or entail; to successfully employ various sub-species of inductive or

deductive reasoning, as for example to reason analogically, arithmetically, dialectically, scientifically, etc.

4.4 DEVELOPING REASONS: Given a question to be answered or a position on an issue, use appropriate inductive or deductive modes of inference to articulate reasons for answering the question one way as opposed to another, or for supporting or for opposing the position.

5: EXPRESSING: To state, describe or represent to one's self or to others the results of one's reasoning and the way one went about producing those results.

5.1 STATING RESULTS: To produce accurate statements, descriptions or representations of the results of one's reasoning activities so as to analyze, evaluate, infer from, or monitor those results, or so as to accurately and effectively recall or represent those results to one's self or to others.

5.2 DESCRIBING PROCEDURES: To represent as clearly as possible how one came to one's interpretations, analyses, evaluations or inferences, so that one might accurately record, evaluate, describe or justify those processes to one's self or to others, or so as to remedy perceived deficiencies in the general way one executes those processes.

5.3 STATING ARGUMENTS: To present arguments which communicate one's grounds for accepting some claim, their logical force in supporting that claim, and, as necessary, meeting objections to the premises one relied on or the reasoning one employed.

6: MONITORING: To self-consciously regulate one's cognitive activities, the elements used in those activities, and the results produced by those activities, particularly by applying analyzing and evaluating to one's own inferring with a view toward confirming, validating, correcting or questioning either one's reasoning or one's results.

6.1 SELF-EXAMINATION : To reflect carefully on one's own reasoning and verify both the results produced and the correct application and execution of the cognitive skills involved; to make a thoughtful meta-cognitive self-assessment; to reflect on the extent to which one's thinking is influenced by deficiencies in one's knowledge, or by stereotypes, prejudices, emotions or any other factors which constrain one's objectivity or rationality; to reflect on one's motivations, values, attitudes and interests with a view toward determining that one has endeavored to be unbiased, fair-minded, thorough, objective, respectful of the truth, reasonable, and rational in coming to one's interpretations, analyses, evaluations, inferences, or expressions.

6.2 SELF-CORRECTION: Where self-examination reveals errors or deficiencies, to design reasonable procedures to remedy or correct, if possible, those mistakes and their causes.

****

ROUND 5-A. PART 2. -- ENDORSEMENTS.

1) Do you endorse the above statement as useful for purposes of assessing the skills dimension of CT at the lower division college level?

2) Would you be willing to have your name listed in association with the above description of CT skills as a contributing member of the Delphi research project which generated it?

*****

ROUND 5-A, PART 3 -- Reactions

The responses to ROUND 4 included some telling observations, thoughtful objections and well focused criticisms. Sharing these with others in the Delphi group is essential to the Delphi process. I've included as many as is feasible and as can be understood outside the context of whatever ROUND 4 item may have prompted them. Rather than use of your time reading positive comments, of which there were many, I've stuck chiefly to the critical ones.

INSTRUCTIONS: Read and consider what our colleagues are telling us. In addition to the adjustments already incorporated into the above draft statements regarding CT and CT assessment, what other responses and improvements should we make? In the light of these comments and other concerns that come to mind, what specific recommendations should we include in our report to the APA Committee on Pre-College Philosophy?

SELECTED RESPONSES ON CT TESTS AND TESTING CT

* "A test cannot be considered in the abstract, without working out its intended use and intended users, the specific population to be tested, and the discriminations the test would be required to make... The domain the test covers is governed by this context, and concepts that constitute subclassifications of the domain are arranged in different ways from the ways in which they might be arranged for a test with the same name but a different purpose... CT can be subclassified in a number of legitimate ways, with many of the same elements recurring in different places in different classification schemes..."

* "There's hardly anything we now need more than improved CT tests. I've used ... in pre-post testing for several years. It's the best I know of. [But...]"

* "...to make sense of CT we must make sense of the critical thinker. The cognitive must be discussed in relation to the affective, and both must be discussed in relation to their roles in the real world. Curriculum and assessment must be put into some broad context. ... There is no one *right* definition of CT, and in testing we should never confuse testing for micro-skills with testing for CT itself. Most CT tests are micro-skill tests only. They are valuable, but only in a qualified way. The Delphi project seems well on its way toward confusing the part with the whole."

* "The [Round 4 list of skills] seems fine to me. There are definite limits to armchair analysis, and *until someone actually starts trying to measure these things, it is difficult to know just how to revise the list* of CT skills and sub-skills."

* "Please interpret my responses cautiously. I have not spent much time trying to define CT. My business is trying to [do] assessment *once you guys arrive at clear and useful definitions!*"

* "We must focus on the purpose and target audience of any given

CT test. Only that way can we fine tune our definition of CT, or should I say our "theoretical construct" of CT."

* "Rather than limit our conception of CT to achieve a certain kind of test, why not simply make more modest claims about the test? Why not say that you are testing *aspects* of CT? This seems more justified. Otherwise the test becomes the tail that wags the dog... Be honest about what we are and are not testing by multiple choice tests. Let's not reduce rich and complex realities like CT to that which can be directly tested in the multiple-choice format."

* [Some of your descriptions] are difficult to test without open-ended items... [For example] it's difficult to test formulation of strategies, MC exams focus more on recognition of best strategy.

* "The categorization system...gives little guidance on what precisely to teach and test. For instance, under "evaluating" is "to assess the credibility of statements." But what should be taught when doing this, and what should be tested when trying to find out what skills students have? If teachers are supposed to act based on what we produce, I believe we need to include criteria for assessing credibility. Again I refer you to..."

* "CT is deeply connected in those individuals who are successful critical thinkers to a pervasive self consciousness about one's own thinking and reasoning processes. Such self consciousness should be deliberately cultivated in our students and should therefore be included somewhere in the overall description -- it is an intrinsic part of the [CT] process. It monitors the selection, application and interlinkage of the various relevant processes."

SELECTED RESPONSES ON CT AND DEFINING CT

* "Until we have a theory of reasoning (a combined normative theory of informal logic along with a descriptive theory of cognitive processes) we will not be able to spell out CT skills non-arbitrary with completeness and precision.... We are producing...a framework, [that is] a list of concepts used for understanding a domain. If that is so, it will play hell out of our attempts to assess CT skills. I doubt that we will be able to manage construct validity for any conventional MC test with our [list of CT skills]. Yet, what we are coming up with is extremely valuable if we focus on performance assessment. Our framework gives us a passably good set of criteria by which one would judge good performance on CT tasks. The criteria are developed by experts -- us -- and we are currently judging whether we accept them or reject them, another step in the process of developing a good performance assessment. The next step would be to distribute typical essays, (good, bad and ugly ones) and aim at some consensus in telling the good ones from the bad ones."

* "We should resist the assertion that CT is domain dependent."

* "I'm beginning to think that to have done all that [we have done] and not have tried to define CT may turn out to be a mistake... What makes [the list of] important, indeed basic, intellectual skills

[in Round 4] a list of *critical* thinking skills? It could just as well be a list of *rational* thinking skills, or logical thinking skills or higher order cognitive skills. ...I fail to see how this list captures the force of the word "critical". [Etymologically] the meaning of "critical" is judging, evaluating, estimating the worth of something... A critical thinker is someone who renders an opinion on an intellectual product...by assessing the strengths and weaknesses of that product... Doing so requires the capacity to elicit and apply standards, principles and criteria. None of the [Round 4] list is really this skill. If we asked for a list of problem solving skills, would we get the same list [as in Round 4]? If so, then either there is no conceptual difference between the two, which I think is wrong, or else the list fails to capture what is distinctive about CT skills. CT also connotes "crucial". [Here] the [Round 4] list fares better, because...these six skills are crucial --i.e., essential for intellectual survival. The problem is that the list is so broad and wide-ranging that it is not clear what intellectual skills have been excluded."

* "If one identifies CT as that which makes a critical person to be what he is, then [your] narrow concept of CT is inadequate. CT is... an answer to the general problem of conformity, prejudice, narrow-mindedness, and irrationality in the world. CT is what one does to achieve autonomy and independence of thought, to lesson one's prejudices, to broaden one's perspective, and to become more *rational*."

* "The main overall worry is that the categories are *much too broad*. When we get down to testing it will not be for something like "assessing logical strength" or "clarifying" but very specific skills such as "recognizing whether something is a necessary or sufficient condition; recognizing the difference between if p, then q's and if q the p's etc. The lines of demarcation are very unclear e.g. between psychological and logical (epistemological) criteria concerning say observation."

* "I have no major quarrel with any parts of your organization, [but] your emphasis leaves out a major component of CT -- the dispositional component and the set of values inherent in being a critical thinker... I think it is a good working model of CT skills, but an incomplete picture of being a critical thinker."

* "There is no attention... to the dispositions... characteristic of CT. These... are as essential to CT as are the knowledge and information used in the processes."

* "The dispositions are at least as important as the skills. I suggest their addition."

* "CT works by recognizing and criticizing sources of information, by drawing implications from given materials, identifying assumptions, noticing relationships of consistency, inconsistency, implications and contradiction, inferring interesting consequences, recognizing, analyzing and evaluating arguments and constructing them as well. Of course, there's a lot more to it."

* "Arguing is not listed as a separate skill!"

* "No mention is made of understanding another's purpose... this would fall under interpreting, I suppose."

* "I disagree with the list of CT skills as described. Interpreting is obviously a cognitive operation. But it is not a *CT* operation. Expressing is essentially low level communication, not generative in the sense of CT. Monitoring is meta-cognitive. The problem is that this description is *so broad* "critical" thinking gets lost in all the other kinds of thinking. This blurs the nature of CT beyond recognition... CT is "judging the worth, accuracy or significance of something."

* "There are several items I mess overall. They may be subsumed in some of the processes you have listed, but very few people will be conscious of them unless they are brought out explicitly. One is the capacity for arithmetical reasoning with ratio and division -- it begins with word problems in 5th and 6th grade arithmetic and carries up to exactly similar reasoning with concepts such as density, composition, contraction, rates of change, in more sophisticated settings. It includes the ration reasoning that goes with scaling areas, volumes rates, etc. This capacity is profoundly important in any CT that involves numerical information (whether it be scientific, economic, sociological, psychological... I'm talking about *arithmetic* and not *mathematics* at the level of calculus or even algebra. [A second capacity to include is] "correlational reasoning." Finally I miss explicit inclusion of the process of translating symbols (e.g. graphs, numerical data, histograms) into words or words into corresponding symbols. Such translation is essential to much CT."

* "[The concept of CT should also include] discriminating explicitly between the factual or experiential input and the inferences drawn, identifying gaps in available information and identifying irrelevant or superfluous information, and it should include the capacity to consider some situation in the abstract and, by applying relevant governing principles or constraints, arrive at reasonable and plausible conclusions about the outcomes that would result from the imposition of some change -- hypothetico-deductive reasoning."

* "Include something about *oppositional reasoning* -- taking the part of one with whom one disagrees. Also include *hypothetical reasoning* -- reasoning from suppositions and hypotheses.

* "Taxonomy" is not a good word for what we've got; it's more like a list. Having a taxonomy in biology and education is to have a hierarchical set of categories such that each subsequent step in the hierarchy subsumes the steps below it. We don't have that here.

* "[Conjecturing] is creative thinking not CT.

* "[To have included seeking and gathering evidence] is ambiguous. We are not scientists.

* "[Regarding expressing,] I don't see any strong rationale for

extending the focus to communicating the results of CT.

* "None of [your six] listed items are skills -- let alone sub-skills. They are general categories into which many (at least dozens of) distinguishable skills may be lumped. This is important.

TABLE OF RESPONSE ON THE ROUND 4 CT SKILLS LIST

	Agree	Disagree	Unsure
1. INTERPRETING	24	-	2
Observing	20	3	3
Decoding	23	-	3
Clarifying	26	-	-
2. INFERRING	23	-	3
Querying	24	1	1
Conjecturing	23	2	1
Drawing Conclusions	24	-	2
3. Analyzing	23	-	3
Locating Arguments	23	1	2
Parsing Arguments	23	-	3
4. Evaluating	24	-	2
Verifying Claims	25	-	1
Assessing Logical Strength	26	-	-
5. Expressing	21	3	3
Stating Results	21	3	3
Describing Procedures	21	3	3
6. Monitoring	24	-	2
Regulating	23	-	3
Reviewing	23	-	3
Correcting	24	-	2

RESPONSES TO "WHAT CT IS NOT"

To help delineate CT through comparisons and contrasts, I offered a list of activities that bore some family resemblances to CT. Each of them depends on CT. But whether any of was CT *per se* was the issue. Here's what you said:

	Isn't CT	Is CT	Partly CT
1. Sensing, (Seeing, Touching, Hearing, etc.)	16	2	5
2. Reading, Listening,	13	4	6
3. Speaking or writing,	14	3	6
4. Motivating, persuading, selling,	14	4	5
5. Interrogating, cross-examining, petitioning,	12	6	6
6. Physically investigating the world around,	13	4	6
7. Trouble-shooting, problem-solving, puzzle solving,	13	4	6
8. Decision-making, selecting, choosing, exercising will,	14	3	6
9. Planning, defining goals and objectives,	10	7	6
10. Finding or ascribing a meaning to art, life, or events,	13	5	6
11. Defending an opinion or belief, arguing a case,	7	7	8
12. Managing, administrating, governing persons or things,	16	2	5
13. Philosophizing,	12	3	8
14. Conducting research within any particular discipline,	12	3	8
15. Experiencing, feeling, emoting, or empathizing,	15	3	5
16. Communicating using language.	15	2	6

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DELPHI ROUND 5-B

Mar. 6, 1989

Dear Delphi Colleagues,

This letter follows the outline in the Round 5-A letter -- questions first, background information second. The focus here is on fleshing out our conceptualization of CT beyond the revised list of CT abilities presented in Round 5-A. Specifically this letter responds to your comments regarding those dispositional and normative dimensions many include when describing CT. The implications for K-12 and college level assessment, curriculum development and pedagogy of including either of these dimensions are crucial for our effort. You're asked for your ideas about this, too.

To get things started, on the next page you'll find a draft statement regarding the dispositional dimension of CT. Following that is a draft statement regarding the normative dimension. These two draft statements are based on your comments regarding needing a fuller conceptualization of CT and an analysis of commonly referenced concepts of CT which appear in the literature. Have at those draft statements. Amend, edit, comment, accept, reject -- whatever you think will help us be able to present an intellectually credible and educationally useful conceptualization of CT.

Coming soon: Round 5-C focuses on our report to the APA Pre-College Philosophy Committee. It will include a proposed outline of that report, showing how the various pieces of the assessment puzzle we've worked on for over a year now will be incorporated. It also picks up the two pieces from Round 4 which haven't been addressed yet, namely the input-output model [which we rather roundly rejected], and the statement of what a cognitive skill is and how cognitive skills might be assessed.

I'll be speaking on March 24 at 1:00 p.m. at the Pacific Division meetings of the APA in Oakland CA, sharing a little of what we've been doing and the direction things seem to be taking. If you happen to be in the neighborhood, please stop by so we can visit.

Knowing you are very busy, I beg mercy and ask you to reply as soon as is reasonably possible. A quickie note with general comments is helpful, if you won't have time to go through things in careful detail.

Thanks for your continuing support and involvement.

Yours sincerely,

Pete Facione

The California State University

Part 1: The Dispositional Dimension of CT

INSTRUCTIONS Reflect on the following statement. Edit, amend, or revise as you see fit. Some background information is presented in the second half of this letter. Please respond to the following questions:

1) Should our final report include a statement on the dispositional dimension of CT? Why, why not?

2) What implications or recommendations for K-12 and college lower division level assessment, curriculum development and pedagogy follow from including a dispositional element in our conceptualization of CT?

CT -- The Dispositional Dimension

In addition to its cognitive skills dimension, CT also involves certain cognitive dispositions, personal traits or intellectual virtues which are crucial to its broad and successful use. Just as with the cognitive abilities dimension of CT, when conceiving of CT assessment or an instructional program in CT, it is important to consider ways of developing materials, teaching strategies and assessment tools which focus on CT dispositions. The cultivation of CT cognitive dispositions is particularly important in insuring the use of CT abilities outside the narrow CT instructional setting. Persons who have developed the intellectual virtues and personal traits listed below are much more likely to apply their CT skills than are those who know the skills but lack the intellectual discipline to use them.

The critical thinker is one who possesses and cultivates the cognitive dispositions, personal traits or intellectual virtues of

* *seeking a clear statement of issues, questions or problems,*
* *curiosity in exploring issues and seeking information,*
* *eagerness in seeking and in employing CT abilities,*
* *openness to seek and to consider divergent views or alternatives,*
* *trust in the processes of reasoned inquiry,*
* *perseverance, diligence and discipline in keeping well-informed,*
* *honesty and humility in appraising one's own reasoning and views,*
* *willingness to seek, use and mention credible sources,*
* *prudence in suspending or making judgments and in taking or changing one's position,*
* *wisdom and persistence in the use of appropriate, defensible and relevant criteria,*
* *effort to address issues reasonably and to remain relevant to the basic concern or problem.*
* *precision, to the extent the subject permits,*
* *orderliness in the treatment of complex issues and processes.*

Part 2: The Normative Dimension of CT

INSTRUCTIONS Reflect on the following statement. Edit, amend, or revise as you see fit. Some background information is presented in the second half of this letter. Please respond to the following questions:

1) Should our final report include a statement on the normative dimension of CT? Why, why not?

2) What implications or recommendations for K-12 and college lower division level assessment, curriculum development and pedagogy follow from including a normative element in our conceptualization of CT?

CT -- The Normative Dimension

In addition to its cognitive skills and dispositional dimensions, CT also involves certain normative features which govern its proper use. Understanding that in making this statement we are going beyond a purely descriptive analysis, we judge it vital to include this normative component in our conceptualization of CT. In a free and rational society education must be more than skills training and more than the inculcation of a set of personal dispositions. Education must include the nurturing of those civic and personal values which insure that the heritage of intellectual fair-mindedness and political freedom will be passed to future generations.

Properly used, CT contributes to the fair-minded analysis and resolution of issues, rather than the blind, sophistic, or irrational defense of views known to be intellectually defective or biased.

Properly used, CT unites those who would reason together objectively in a reflective and intellectually sound process, even if their final judgments and analyses should disagree.

Properly used, CT promotes rational autonomy, intellectual freedom, and the objective investigation of any issue or concern whatsoever.

Properly used, CT treats all affected persons with sensitivity and with equal respect and dignity -- it is never exclusively self-interested, abusive, coercive, or without integrity and good faith.

Thus, in a free, open and rational society, when conceiving of CT assessment or an instructional program in CT, one ought to consider ways of developing materials, teaching strategies and assessment tools which insure the normative dimension of CT will be developed in students, in addition to CT skills and dispositions.

ERIC

Part 3 --BACKGROUND

For your consideration, here are the views of six widely cited persons regarding what CT involves.

1) CT is. ... "Active persistent and careful consideration of a belief or supposed form of knowledge in light of the grounds that support it and the further conclusions to which it tends" John Dewey. 1909

2) CT "is reasonable reflective thinking that is focused on deciding what to believe or do." In addition to 12 CT abilities, CT also includes 14 dispositions. Namely: "to seek a clear statement of the thesis or question, to seek reasons, to try to be well informed, to use credible sources and mention them, to take into account the total situation, try to remain relevant to the main point, to keep in mind the original or basic concern, to look for alternatives, to be open-minded, to take a position when the evidence and reasons are sufficient to do so, to seek as much precision as the subject permits, to deal in an orderly manner with the parts of a complex whole, to use one's CT abilities, to be sensitive to feelings, level of knowledge, and degree of sophistication of others" Robert Ennis, 1987.

3) "CT is an attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experience; knowledge of the methods of logical inquiry and reasoning; and some skill in applying those methods..." E.G. "recognize problems, find ways to meet them, marshal pertinent data, recognize assumptions use language well appraise evidence evaluate statements, see logical relationships, draw warranted inferences, test one's own conclusion, reconstruct one's beliefs based on experience, render accurate judgments." Edward Glaser, 1941.

4) "CT can be characterized as skeptical, radical, disillusioned, problem-seeking, holistic, judgment-oriented, non-algorithmic, constructive, comprehensive, empathic, meta-cognitive, higher-order, reflective reason-governed, logical, self-correcting, context-sensitive, criterion-referenced, crisis-oriented, normative, inferential, pragmatic, purposive, relational, and open- minded." Matthew Lipman, 1988.

5) "A given student, S, is a critical thinker in some area requiring mental effort, X, if S has the disposition and skill to solve problems in X using some subset of the available evidence E pertinent to activities in area X. "CT" has an identifiable meaning but the criteria for its correct application vary from field to field." John McPeck, 1981.

6) CT is disciplined, self-directed thinking which exemplifies the perfections of thinking appropriate to a particular mode or domain of thinking. It comes in two forms. If thinking is disciplined to serve the interests of a particular individual or group, to the exclusion of other relevant persons and groups,... it is sophistic or weak sense critical thinking. If the thinking is disciplined to take into account the interests of diverse persons or groups, it is fair-minded or strong sense critical thinking." Richard Paul, 1988.

Here are your comments regarding statrment #6 in the caveats and cautions section of Round 4, *"If CT is a set of attitudes as well as a set of skills, that poses no problem for assessment because we can just develop ways to assess the CT attitudes too."*

-- "Difficult to do!"

-- "[This] seems too facile. To be sure, rhetoricians and social scientists study attitudes and so have developed ways to ascertain or measure certain attitudes. But does this mean that *all* attitudes can be so tested? How can we talk about whether certain attitudes can be tested until we have enumerated those attitudes and so know specifically what we are trying to test? Also, can't some aspects of proficiency in CT, or beinn a critical thinker, involve both skill and attitudes combined? If CT involved recognizing one's own prejudices and stereotypes, one must have an attitude of willingness to confront one's stereotypes and the skill to delineate and recognize them. Attitude and skill would go hand in hand. We don't just have a set of skills and as set of attitudes. This is too atomistic a description."

-- "Agree" [with (6) as stated, no comment.] 6 people.

-- "Agree, we should teach skills and dispositions, the attitudes are minor."

-- "Agree, but attitudes are harder to test."

-- "Agree. CT is more a set of attitudes than a set of skills... It is easier to change attitudes in a single course than to improve skills substantially. Changing attitudes and fostering self-monitoring should lead to lifelong improvement in a student's CT performance. So it's actually very important to say something about assessing CT attitudes..."

-- "Disagree. The attitude/skill distinction isn't that sharp."

-- "How?"

-- "Good luck!"

-- "Unlikely."

-- "There is a very great difference between skills and attitudes (although there are elisions at the boundaries of both concepts). Richard Paul has taught us most effectively [that] there is, or should be, a causal relation between skill and disposition such that the disposition might/should elicit, motivate, and work as side-constraints for the skills."

Here are your comments regarding statement #7 in the caveats and cautions section of Round 4, *"CT is thinking skills. Saying CT is a set of attitudes may be a way of describing what people who are good at CT are like, but it is not a way of describing CT itself.*

-- "Good point!"

-- "[This] simply expresses a position dogmatically, and in the light of discussions by Richard Paul, Harvey Siegel, and others this is just not acceptable. To dismiss these positions without argument is just not philosophical!... [This] simply rules out a major position on what CT is.

-- "Agree" [with (7) as stated -- no comment]. 3 people.

-- "The attributes required for CT *can* be *instilled* given enough time and the right emphasis of subject matter in CT, but not *all* CT subject matter instills proper attitudes.

-- "Disagree" [with (7) as stated -- no comment]. 3 people.

-- "Disagree, [we] need to include some of the attributes."

-- "Good move. Go for the [CT] itself!"

-- "Agree, but I often find that performance does not change until I get a change in attitude. That the attitude has changed is best seen in the improved performance... The most important attitude is "I really want to find out what you believe, and what your reasons for believing it are. Then when I am sure that you agree that I have understood you, I will think about and state where I differ from you."

-- "Agree, but our ultimate concern is to encourage people to think critically when it is appropriate to do so. And that requires a critical spirit (critical attitudes) as well as thinking skills and knowledge."

-- "Disagree. The attitude/skill distinction isn't that sharp."

-- "Of course, some descriptions of dispositions are ways of describing what people who are good at CT are like, but I fail to see how it follows from this that they are not also ways of describing CT itself."

***

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DELPHI ROUND 5-C

Mar. 10, 1989

Dear Delphi Colleagues,

This letter asks you to consider three things:
(1) An outline of our report to the APA, (page 2),
(2) A comment on skills and skill assessment, (page 3),
(3) Specific recommendations we should make, (page 4)

Your ROUND 4 comments on what a skill is and how a skill can be taught and assessed are very revealing. Take a look, for example, at the differences of opinion over the relative superiority of two of the strategies of assessment. The research Steve Norris is doing, whether or not idiot savants can be said to be skilled, and the basic conflict between practical efficiency and accuracy in assessment, all found there way into your responses. (See pages 5 and 6.) This is another example of when an apparently off the wall question stimulated some useful ideas.

Early responses to ROUND 5-A are coming in already. That's great.

Please respond to the three round five letters as soon as is reasonably possible for you. I plan to start putting our report together this semester. Naturally you'll have a shot at it before final revisions. If all goes well we'll be ready to submit our report to the Pre-College Committee in the fall.

Depending on the quality of the recommendations that come, we could be very close to wrapping things up. Thanks for your continuing support and active involvement.

Yours sincerely,

Pete Facione

The California State University

Part 1: Proposed Outline of Our Report

INSTRUCTIONS: Consider the following outline of our Delphi research report to the American Philosophical Association Committee on Pre-College Philosophy. Comment, make any and all additions, deletions, amendments, changes you think reasonable.

CT -- A Theoretical Construct for Purposes of Assessment
Submitted to the Pre-College Philosophy Committee
American Philosophical Association

EXECUTIVE SUMMARY

A. Delphi Conceptualization of CT
B. List of Delphi Recommendations
C. Endorsement of Members of Delphi Research Panel

REPORT

I. Introduction
- A. The Concern for CT Assessment
  1. National interest and large scale assessment
  2. CT assessment in the individual classroom
  2. APA members concern, college and K-12 level
- B. Formation of the Delphi Research Project
  1. Charge to the project director
  2. Description of Delphi Research Methodology
  3. Building the Delphi Panel of Experts.

II. Delphi Findings, Points of Agreement and Disagreement
- A. Preliminary assumptions, [Rounds 1 and 2]
- B. Conceptualization of CT, [Rounds 3, 4, and 5]
  1. CT -- the skills dimension
  2. CT -- the dispositional dimension
  3. CT -- the normative dimension
- C. General Comment on Assessing a Skill. [Rounds 4 and 5-C]

III. Recommendations
- A. General Considerations Regarding Educational Assessment
  1. Validity, Reliability
  2. Difficulty and Discriminability
  3. Purposes of a CT assessment
  4. Characteristics of persons being assessed.
- B. Strategies for Classroom CT assessment
  1. Some questions to ask one's self
  2. Assessment, pedagogy and curriculum development.
  3. Suggestions on putting together a classroom CT test.
- C. Comments on Large Scale CT assessment

IV. Appendices
- A. A Quick List of Purported CT Assessment Tools
- B. A CT Bibliography with emphasis on Assessment
- C. Delphi letters from each Round
- D. Response rates to each Delphi and other tabular data
- E. List of Delphi Panel of Experts

Part 2: General Comment on Assessing A Skill

INSTRUCTIONS: This revision is based on you Round 4 comments. Please edit. You migh' first read your colleagues' comments, on pp. 5 and 6.

A skill is the ability to perform certain processes or procedures more or less well. Having a skill includes being able to do the right thing at the right time. So, being skilled at something involves knowing, perhaps implicitly or without the ability to articulate this knowledge, a set of procedures and when to apply those procedures. It also involves having some degree of proficiency in executing those procedures. Reflecting on and improving one's own skills involves judging when one is or is not performing well, and considering ways of improving one's performance.

It is generally thought that skills, particularly cognitive skills, can be taught in a variety of ways including making the procedures involved explicit, describing how they are to be applied and executed, explaining and modeling their correct use, and justifying their application. Teaching cognitive skills also involves exposing learners to situations where there are good reasons to exercise the desired procedures, judging their performance and providing the learners with constructive feedback regarding their proficiency and ways of improving it. Instruction might start with situations that are artificially simple, but it should culminate in situations that are realistic and complex. Teaching is not everything. The learners must contribute a measure of effort, attention, practice, desire, and self-monitoring. Teaching skills involves motivating learners to achieve higher levels of proficiency and, particularly in the case of CT, independence. It also may involve coaching learners on how they can achieve those goals.

Persons can be judged as being more or less proficient in a given skill. The first way of assessing is to observe the person performing the skill and make a judgment regarding the degree to which the person possesses the general skill in question. A second way is to compare the outcomes (if any) that result from executing a given skill against some set of criteria. A third way is to query persons and receive their descriptions of the procedures and judgments they are using as they perform that skill, would use if they were to perform that skill, or did use when they performed that skill. A fourth way is to compare the outcomes (if any) that result from performing another task against some set of criteria, where the performance of that other task has been shown to correlate strongly with performance of the skill of interest. No matter which way is used, it is important to ensure that the test conditions foster an attitude in which the test-takers are disposed to use their skills as well as they can, and are not constrained or inhibited from doing so. It is highly advantageous to cross check the results of any one way of assessment against the results of other ways.

Part 3: Recommendations

INSTRUCTIONS: Considering what we know and don't know about CT assessment today and considering the direction our Delphi effort has taken us, what advise, suggestions, recommendations should we make regarding CT assessment in the classroom or larger scale enterprises, (e.g. naticnal, state, district wide, college wide CT assessment)? Mention your intended audience, and be as precise about the recommendations as possible. [e.g. To ETS and ACT we should say, ...; to teachers of primary grades we should say,...; to professors who teach CT at the college level we should say,...; to the research community in cognitive psychology we should say,...].

To help you think through this most important matter of making recommendations, I've drafted some questions. You need not respond to them. They're only to stimulate thinking. Rather, formulate specific recommendations. Oh! A plea for mercy: I have no staff, so please don't ask that I search for things you might have once said about this someplace else.)

1. What questions have you found it useful to ask yourself regarding your own assessing of CT in teaching or professional work?

2. How might a college age person who possessed the CT abilities we have described be able to show that she had those abilities?

3. What about showing that she has the designated CT dispositions or normative attitudes, (should we decide to include those in our final report)?

4. How might a person in elementary school, junior high or high school show that she has those CT abilities, dispositions or normative attitudes?

5. What questions or tasks might you ask a group of persons to undertake if you wanted good evidence regarding which persons were better at CT than which others?

6. If you were doing a workshop for teachers at some grade level, what would you tell them about CT assessment?

7. If you were serving as a consultant to some organization which wanted to initiate large scale CT assessment, like a school district, university, or state department of education, what would your recommendations be?

8. If a colleague and friend asked what you really thought about how CT can best be taught, learned and measured, what would you tell your friend to do or avoid doing?

9. What makes you optimistic about CT assessment?

10. What do you most fear about CT assessment?

Here are some of your comments on the idea of a skill and how skills can be taught and assessed.

* "... Your ways of teaching skills are conspicuous in their lack of explicit emphasis on educational values including the use of morally justified procedures in teaching. Similarly your ways of learning lack such educationally important activities as explaining, understanding and justifying."

* "Mental skills are no less directly observable than physical skills. Skills are abilities, and abilities can't be observed. Thus, *observing the skill as it is being performed* is impossible for any skill."

* "I have my doubts about ... the implicit mind/body dualism. Performances can be measured directly (e.g. by observing a surgeon's technique and results) and indirectly (e.g. by a paper and pencil test of knowledge of anatomy). Both constitute a sample from which inferences are made to the more general skill, and this is all we need to concern ourselves with..."

* "Your description exclude any effort, visualization, mental rehearsal, or using of any inner resources a person brings to skill learning and skill performance -- concentration, automaticity, goal directedness etc."

* "[The narrative] presupposes that if one has a skill, one consciously knows the intricacies and interworking of that skill. Often this is simply not the case. ... Indeed idiot savants may be said to possess skills with little or no understanding of how they perform skilled activities. ... [Those who] understand [how they arrive at the correct result] are better critical thinkers [than those arrive at the result] with no real understanding of the rationale.

* "...Don't we observe performances which we interpret as being skillful or being evidence of skill at a certain degree or level."

* "It seems odd to talk about performing a skill, given the initial equating of a skill with the ability to do something well."

*** [The second way is superior to the third...]

"because the third way can be employed only after it has been settled that the person has the skill, and that can be settled only by comparing outcomes against criteria, i.e. by employing the second way. In short the third way is parasitic on the second. Beside, a skilled person may not even be able to describe the procedures and judgments used when executing the skill."

"for the assessment of average people, because (1) CT skills are generally employed unconsciously so the third way just won't work for average people, and (2) it's fast, cheap and yields unambiguous (if not wholly trustworthy) answers... But the third way is superior when dealing with experts, whom we can expect to be conscious of their procedures. If we can get an account of their actual thought processes, then we can assess those processes directly rather than indirectly."

"if instead of *outcome* we also include how the answer is arrived at; thus an idiot savant can produce answers to complex equations but not by any process we understand (or she does); if we limit ourselves to outcomes in

judging skill, we'll miss the distinction between the highly skilled arithmetic operator an the idiot savant. Since I would want to claim that the idiot savant is not a case of skill at all, this presents some difficulties."

"because performance is what we want, provided that *outcomes* include the steps taken. That is, if a student makes a good judgment on someone's reasoning, I would want to know how he/she got to that judgment."

"because it is much easier to carry out in practice, provided that there are enough items to compensate for accidental correct and incorrect outcomes..."

"because it may be less time-consuming, and because it would be easier to design instruments for..."

"because it does not depend *completely* on the testimony of the individual about what occurred. That's a strength because the literature on self-reports suggests enormous difficulties with the agent's own accounts of their activities. If we have the product, and the account of the process which yielded it, we're in better position to judge the degree of skill."

*** [The second way is not superior to the third...]

"because the second is a prerequisite for carrying out the third; that is, to do a credible job of querying a person must fist have completed a strong comparison and examination of the argument"

"because, as far as CT is concerned, [the second] does not reveal the understandings and reasoning behind the answers given, but just assesses overt answers against some criterion. Clearly one could come to "wrong" answers depending on his understandings of the situation, and yet this reasoning not be a violation of, or deficiency in, CT. Suppose someone asks how many piles of beans we may divide 27 beans into, if we put 5 beans in each pile. Suppose someone says 6, because he allows that we can have small piles, the remainder can constitute a pile in its own right. Given his understanding, he has given the "right" answer. Does having his understanding mean he is not thinking critically? ...Obviously, the third way has its drawbacks, since it is far more consuming than checking outcomes against a set of criteria. A truly superior method of testing CT would incorporate both."

"because there are often other possible explanations of the outcomes."

"because the outcome could have been accidental or a consequence of good luck, or bad luck, or in the case of testing, copied."

"because the third method might reveal that a person has good CT skills where the second method suggested poor skills."

"[if one cannot specify] the criteria against which to judge the process-outcome."

* "I do not regard the second and third ways [of assessing] as constituting a hierarchy with one way superior to the other. I use both ways in assessing students and check the two against each other, whenever I can.

* "Part of the problem with analyzing CT into skills is that a good deal of the knowledge that makes up CT (quite apart from the so-called knowledge which it presupposes) is propositional knowledge and not a skill. One cannot spot an argument or assess it validly without being able to define what an argument is and what valid is. Forcing CT into skills is basically confused."

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May 9, 1989

Dear Delphi Colleagues,

Dozens of responses to rounds 5-A, 5-B, and 5-C have come in. Again I find myself admiring your perceptive analyses and sound suggestions. And I am not just saying that to make you fell good. Your responses range from the outstanding to the excellent. Often I find myself writing "good point" and "remember" in the margins of your letters.

Some of you have not responded yet the ROUND FIVE letters. But the notes or phone calls from those too busy to jump in to round five were certainly appreciated. If you still have round five on you desk and are wondering whether or not to respond now that the semester is coming to an end the answer is please, by all means. We need your input not just to keep up the quantity of participants but also for your ideas and insights. There is still time to reply before I start putting together the draft of our final report, a project I will not undertake until August or September. For the summer I've taken on a huge teaching load to help three of my children and my wife continue their undergraduate and graduate educations.

I hope to make two presentations at the Sonoma State conference in August. One is a workshop on CT assessment, the other is tentatively called "The Marlboro Man and Broad-Shouldered CT" The paper, "Assessing CT and Building Consensus on CT," delivered at the Pacific Division meetings of the APA went well. I'm doing a similar presentation for the Education Colloquium of UC Davis next week and again in Baltimore in Sept. A couple of junior colleges and a couple of state universities in California have asked me to do staff development presentations on CT assessment. A favorite is "Thirty Ways to Mess Up a CT Test," another is "What is an Elephant, or Defining CT for Practical Purposes."

The above is a not too subtle way of saying I'm available if you are planning something on CT.

CSU Fullerton has given me some time next academic year to pilot test a CT assessment instrument. The curriculum committee at our university defines CT based on CSU executive order 338. For those of you outside CA, that executive order gives a general specification of CT for purposes of requiring a "CT course" be included in the general education program of all twenty of state universities. That definition is not inherently inconsistent with our Delphi findings, but it is far less sophisticated. If my research project goes along as planned, then by this time next year I should know if the CT assessment tool we will have put together is capable of detecting improvements in students' CT which result from their taking a 3 unit required lower division CT course from the Philosophy Dept. This is a dangerous question! Ironically, a key assumption in our experimental design is that the Philosophy faculty teaching CT are doing an effective job. The experiment is to find out if the assessment tool is sensitive enough to detect the difference *we assume* our CT instruction is making.

Have a good summer.

Sincerely,

[signature]

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*** FINAL ROUND ***

DELPHI ROUND 6

Sept. 25, 1989

Dear Delphi Colleagues,

Please review the enclosed final draft. Your your comments, substantive or editorial, are vital. Be sure to check the consensus statements in the Tables and the final recommendations. TO BE HELPFUL YOUR COMMENTS AND SUGGESTIONS MUST REACH ME BY OCT. 30.

The final report to the APA Committee on Pre-College Philosophy is due in November. Its intended audience is educators, at any level, interested in CT. To clarify, as principle investigator my role is to express the Delphi findings objectively, whether they be points of consensus, majority positions, or minority opinions. I am not one of the 46 expert participants. I hope you find the draft a clear and fair-minded expression of the delicate confluence of your expert opinions.

ROUNDS 5A, 5B and 5C were extremely useful. Of the 46 experts, 26, 23 and 22 responded in these rounds. ROUND 5A confirmed the strong consensus regarding the cognitive skill dimension of CT. ROUND 5B showed that 61% of the experts hold that CT includes affective dispositions, but 30% maintain CT does not. However, over 80% would be willing to use the same list of affective dispositions in describing the paradigm critical thinker. Although everyone recognized the personal and civic value of CT, only 17% argued that "CT" has a normative meaning. ROUND 5C produced several thoughtful recommendations relating to CT teaching and assessment. Be sure to consider these carefully and expand on them if you think it would be of general use to K-12 or college educators.

In Delphi research once an expert expresses an opinion, even a dissenting one, it becomes a factor in the mix and flow of all subsequent argument and thought. Because of this, and because in Delphi research it is reasonable to assume that silence from busy experts is a sign of general accord with the direction of inquiry, I will continue to operate on the principle that unless you object, you find things generally acceptable.

My respect for your collective and individual wisdom and my gratitude for your participation are so deep that I cannot possibly express either as fully as I feel them. Thank you so very much for being part of this two year adventure. I hope the final report does justice to what you think.

I am most appreciatively yours.

The California State University

Peter A. Facione